THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXIII. No. 1884.] LONDON, JUNE 20, 1899. [51ST YEAR. PRICE 6d.

ABSALOM HARROP
(Maker to the Admiralty),
FITZROY BELLOWS WORKS,
SHEFFIELD.

MANUFACTURER OF THE
PATENT CIRCULAR DOUBLE & SINGLE
Blast Bellows.

Patent Portable Forges, Vices, & Vice-Benches, Patent Tue Irons, Anvils, Swage Blocks, &c.

Stocks and Dies, Hammers, and Smiths' Tools in general.

Telegraphic Address: "BELLOWS, SHEFFIELD."

HEBBURN MAIN GAS COALS.

Yield of Gas per Ton . . 10,500 Cubic Feet.
Illuminating Power . . . 16·4 Candles.
Coke . . . . . 68 per Cent.

For Prices, f.o.b. Ship or Delivered by Rail, apply to
The Wallsend & Hebburn Coal Company, Ltd.
8 Lombard Street,
NEWCASTLE-ON-TYNE.
W. RICHARDSON, Fitter.

HEATHCOTE GAS COAL.

Rich in Illuminating Power and Yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

THE GRASSMOOR CO., LD.,
CHESTERFIELD.

— ESTABLISHED 1830. —
PARKER & LESTER,
Manufacturers & Contractors.

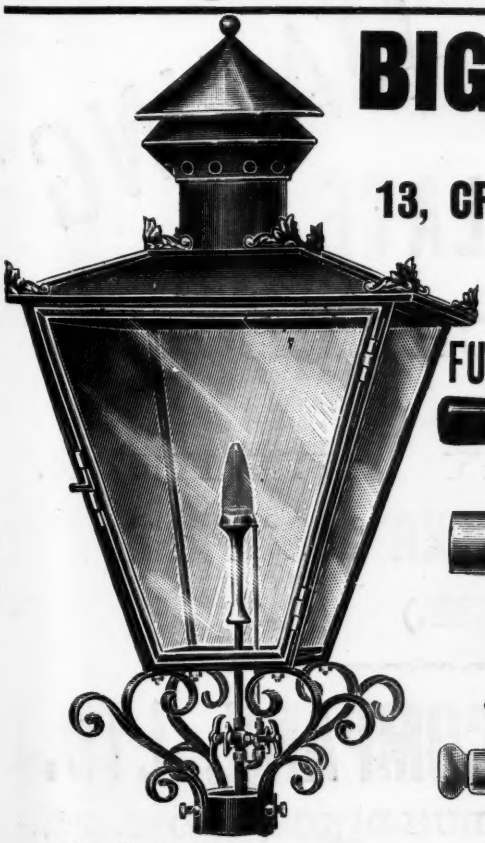
THE ONLY MAKERS OF
PATENT ANTIMONY PAINT,
Parker's Imperial Black Varnish,
Oxide Paints, Oils, and General Stores, for Gas and Water Works.

WORKS:
ORMSIDE STREET, OLD KENT ROAD
LONDON.

ROBERT MARSHALL,
CANNEL COAL MERCHANT.
97, WELLINGTON STREET, GLASGOW.
Prices and Analysis of all the Scotch Cannels on Application.

Wrought-Iron
TUBES
And Fittings and Accessories.

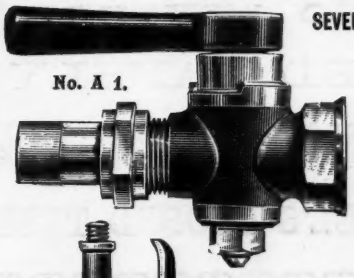
LAMBERT BROS., WALSALL,
MANUFACTURERS OF
WROUGHT-IRON TUBES & FITTINGS for GAS, WATER, & STEAM,
BRASS GAS-FITTINGS, GAS-VALVES, STEAM & WATER VALVES, TOOLS, &c., AND OF
WARNER'S PATENT MARKET GAS STAND-PIPE.
LONDON: LAMBETH BRASS & IRON CO., Ltd., Short St., LAMBETH.



The "DEMAND," REGISTERED *

BIGGS, WALL, & CO.,
GAS AND WATER ENGINEERS,
13, CROSS STREET, FINSBURY PAVEMENT,
LONDON, E.C.

WRITE FOR OUR **PRICE LISTS** OF
FULL-WAY MAIN TAPS & LANTERN TAPS.
SEVERAL DESIGNS SHOWN BELOW.



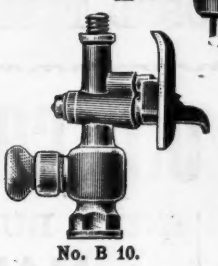
No. A 1.

THESE TAPS ARE
FULL-WAY
AS SHOWN.

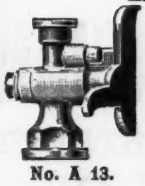
No. A.

SUPERIOR QUALITY AND FINISH IN GUN METAL.

LANTERN TAPS.



No. B 10.



No. A 13.

No. A 12.

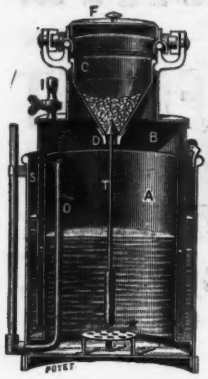
No. A 1.

* Specially constructed for New Incandescent Burner.

THE LIGHT OF THE FUTURE

THE STRONGEST AND MOST BEAUTIFUL LIGHT KNOWN.

ABSOLUTELY HARMLESS.



ACETYLITE Ltd., 400, New John St. West, Birmingham.

THE ONLY SYSTEM OF GENERATING PURE ACETYLENE GAS.

Installations for Private Houses, Streets, Works, Railway Stations, Carriages, &c.

ESTIMATES AND CATALOGUES SENT ON APPLICATION.

National Telephone: No. 2481. Telegrams: "GENERATOR, BIRMINGHAM."

JOSEPH EVANS & SONS, CULWELL WORKS, WOLVERHAMPTON.

PLEASE APPLY FOR CATALOGUE No. 8.

Telegrams: "EVANS, WOLVERHAMPTON." National Telephone No. 7039.

TRADE MARK.

FIRST AWARDS EVERYWHERE.

SEE NEXT WEEK'S ADVERTISEMENT FOR STEAM-PUMPS, &c.

OIL FOR GAS MAKING

PURE DISTILLATE.

HOMOGENEOUS IN CHARACTER.

NO MIXTURE.

CAN BE STORED SAFELY ANYWHERE.

FLASH POINT GUARANTEED OVER 200° FAHR.

(ABEL'S CLOSED TEST.)

ANGLO-CAUCASIAN OIL COMPANY, LTD.

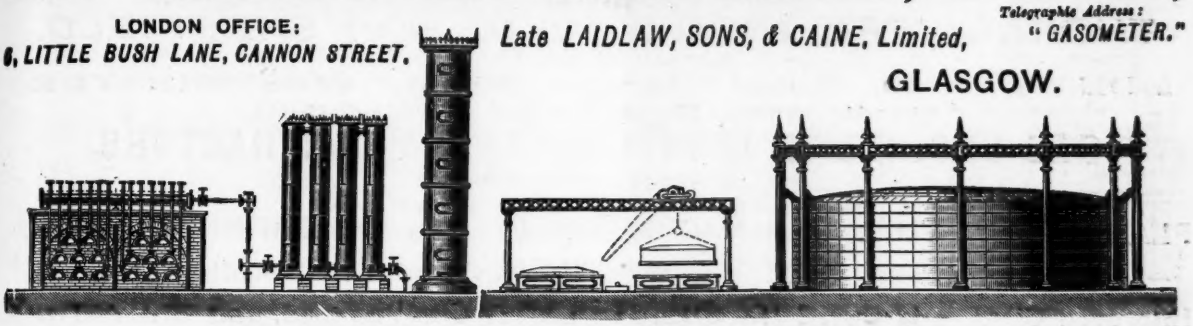
8, 9, 10, & 11, LIME STREET, LONDON, E.C. | INDIA BUILDINGS, CROSS ST., MANCHESTER.

THE BARROWFIELD IRON-WORKS, LIMITED,

LONDON OFFICE:
6, LITTLE BUSH LANE, CANNON STREET.

Late LAIDLAW, SONS, & CAINE, Limited,
GLASGOW.

Telegraphic Address:
"GASOMETER."



MANUFACTURERS OF ALL KINDS OF GAS PLANT.

RETORT-BENCH FITTINGS; SIEMENS'S REGENERATIVE AND ORDINARY FURNACES;
CONDENSERS, EXHAUSTERS, AND ENGINES; SCRUBBERS, WASHERS;
PURIFIERS, WITH PLANED AND CEMENT JOINTS,
DRY AND HYDRAULIC CENTRE-VALVES;
HYDRAULIC AND HAND-POWER LIFTING APPARATUS;
GASHOLDERS, SINGLE-LIFT & TELESCOPE; CAST & WROUGHT-IRON TANKS,
STATION METERS; GOVERNORS; SCREW AND RACK VALVES;
FOUR-WAY COCKS AND HYDRAULIC VALVES;
CAST-IRON GAS, WATER, & STEAM PIPES & CONNECTIONS; WROUGHT-IRON TUBES & FITTINGS;
IRON ROOFING. MARKET BUILDINGS. BRIDGES. GIRDERS. STEAM BOILERS,
PROMENADE PIERS AND LOADING WHARVES.

MANUFACTURERS OF OIL PLANT OF EVERY DESCRIPTION.

HENDERSON'S Patent Retorts, Condensers, Stills, Cast and Wrought Iron Tanks, Ammonia Stills, Wrought-Iron Gas-Mains, &c., &c.

DESCRIPTIVE SPECIFICATIONS AND ESTIMATES ON APPLICATION.

GEORGE ORME & CO.,

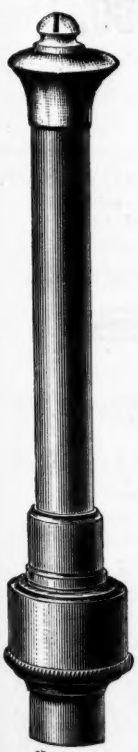
(BRANCH OF METERS LIMITED),

MANUFACTURERS OF IMPROVED WET AND DRY GAS-METERS,

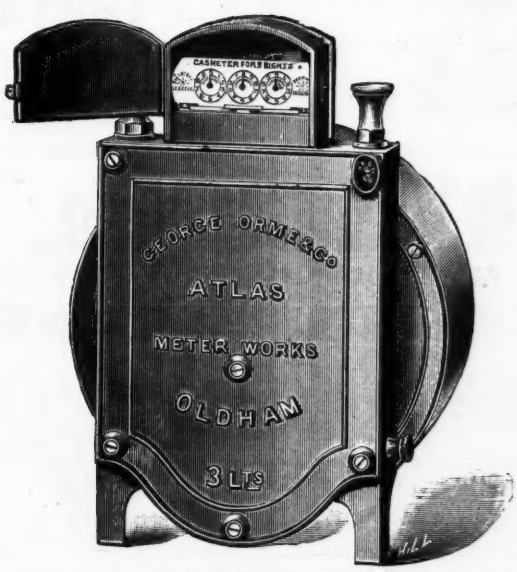
Telegraphic Address:
"ORME, OLDHAM."

ATLAS METER WORKS, OLDHAM.

National Telephone
No. 93, OLDHAM.



No. 200.



WET GAS-METER IN CAST-IRON CASE.

DRY GAS-METER IN STRONG TIN-PLATE CASE

ORME'S GAS REGULATOR FOR STREET LAMPS.

AS ILLUSTRATION NO. 200.

Adopted by the leading London and Provincial Gas Companies. More than 150,000 now in use.

Main Gas Cocks, Pressure-Gauges, & all descriptions of Gas, Water, & Steam Fittings in stock.

Illustrated Price Lists and full Particulars on application.

NEWTON, CHAMBERS, & CO.,

LIMITED,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.

Established 1790

LONDON OFFICE: 19, Great George Street, WESTMINSTER.

Telegraphic Addresses: "NEWTON, SHEFFIELD," "ACCOLADE, LONDON."

GAS ENGINEERS, IRONFOUNDERS, & CONTRACTORS.

Manufacturers of every description of

PLANT, APPARATUS, and MACHINERY for GAS and CHEMICAL WORKS.

RETORTS and FITTINGS, MOUTHPIECES with Self-Sealing Lids.

Improved COAL and COKE HANDLING PLANT, CONVEYORS, and ELEVATORS,

CONDENSERS, SCRUBBERS, and WASHERS.

PURIFIERS with Planed Joints a Speciality.

Patent CENTRE-VALVES, RACK and SCREW VALVES, WOOD GRIDS, and SCRUBBER-BOARDS, CAST-IRON MAINS, and SPECIALS.

STRUCTURAL WORK, COLUMNS, GIRDERS, and ROOFING.

GASHOLDERS, Cast-Iron or Steel Tanks.

DESIGNS, SPECIFICATIONS, and ESTIMATES FREE.

PIG IRON (Special Quality) for Engine Cylinders. GAS COAL famous for its UNRIVALLED EXCELLENCE.

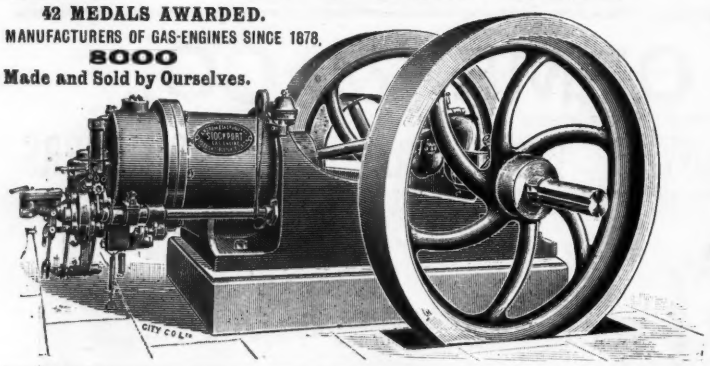
NEW DESIGN "STOCKPORT" GAS-ENGINES

42 MEDALS AWARDED.

MANUFACTURERS OF GAS-ENGINES SINCE 1878.

8000

Made and Sold by Ourselves.



With Otto Cycle and our own Patented Improvements.

All Sizes from 1½ H.P. to 250 Brake H.P.

SEND FOR LATEST PRICE LIST.

The Greatest Brake H.P. given for the Smallest Gas Consumption.

SIMPLE IN EVERY DETAIL.

J. E. H. ANDREW & CO., LTD.

REDDISH, near Stockport.

London Address: 80, QUEEN VICTORIA STREET, E.C.

DEPÔTS IN ALL THE PRINCIPAL TOWNS.

BARRY, HENRY, & CO., LTD.,

ABERDEEN, SCOTLAND, and 64, Mark Lane, LONDON, E.C.

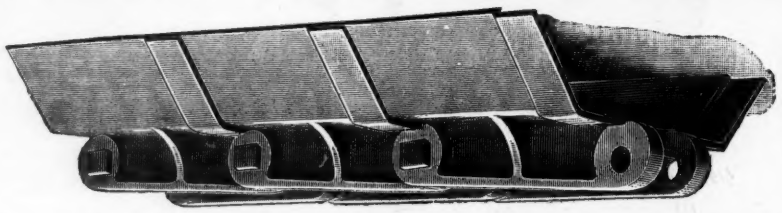
SOLE MAKERS OF HACK & PIGGOTT'S PATENT COKE-CONVEYING PANS AND LINKS COMBINED.

COKE-CONVEYORS.

Specialities:

TRANSMISSION OF POWER.

Rope and Belt Pulleys, Spur and Bevel Wheels, Shafting and Couplings, Pedestals, and Fixings.



Specialities:

TRANSMISSION OF MATERIALS.

Conveyors, Elevators, Grinding Machinery, Motors.

The only Coke-Conveyor which has proved a thorough success.

ALSO HACK AND GILES' PATENT CONVEYOR PAN LINKS.

WRITE FOR PRICES AND PARTICULARS.

The fullest Inquiry invited. Can be seen at work in some of the principal Gas-Works in the United Kingdom, where they are giving the utmost satisfaction.

BRAY'S

"SPECIAL"

GAS-BURNERS.

Gas Managers should consider the advisability of recommending their Consumers to use Bray's "SPECIAL" Gas-Burners, thereby obtaining High Illuminating Power.

GEO. BRAY & Co.

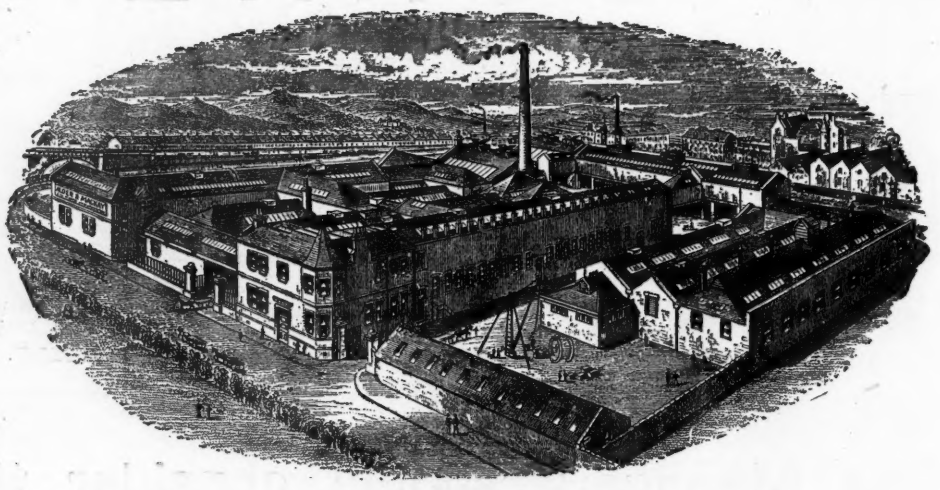
GAS-LIGHTING ENGINEERS,

Bagby Works, LEEDS.

ALDER & MACKAY

ESTABLISHED 1850.

GAS-METER MANUFACTURERS.



SPECIALITIES.

Dry Meters in Cast-Iron Cases.

Wet and Dry Prepayment Meters.

Green's Patent Underground Wet Meters.

NEW GRANGE WORKS, Telephone No. 81 Western. EDINBURGH.

Telegrams: "ALDER" EDINBURGH OR BRADFORD.

VENTNOR STREET WORKS, Telephone No. 1222. BRADFORD.

W. C. HOLMES & CO.

PATENT 'NEW' SCRUBBER-WASHER

In HORIZONTAL or VERTICAL FORM, where economy in FLOOR AREA is required.

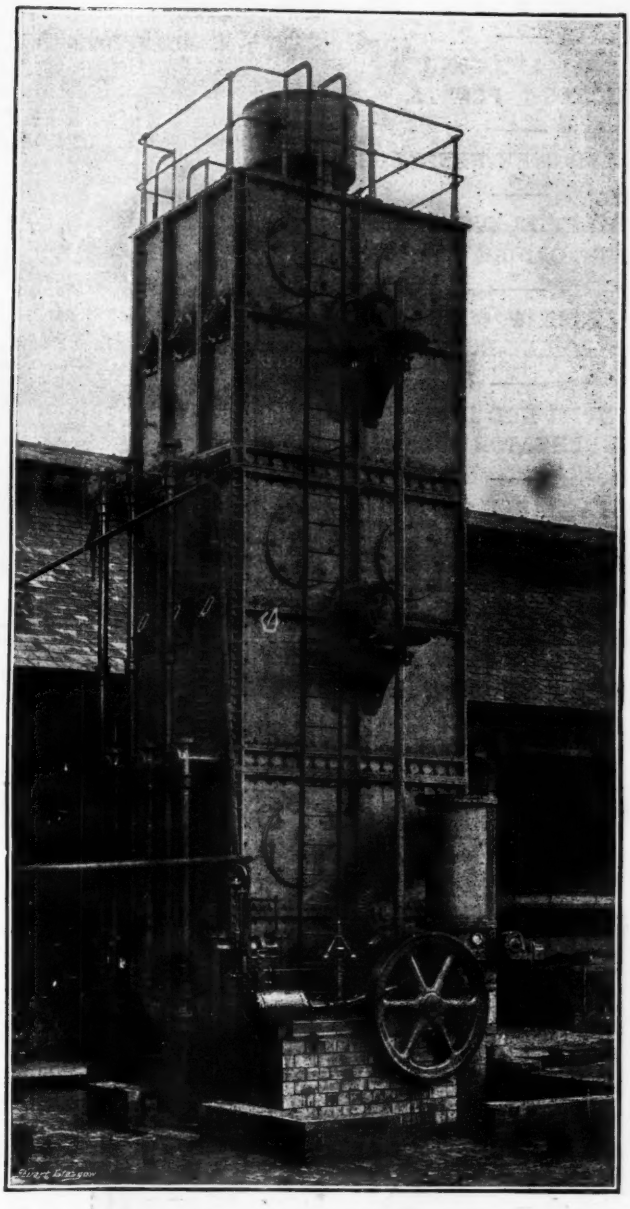
Removes every trace of Tar that may escape Condensation in the Condensers.

Complete Extraction of Ammonia from the Gas without affecting the Hydrocarbons.

Maximum Strength of Liquor obtained.

Minimum Quantity of fresh Water required.

Removal to a large extent of the Sulphuretted Hydrogen and Carbonic Acid Gas.



A Machine constructed for 1,500,000 cubic feet of Gas per diem dealt efficiently with 1,800,000 cubic feet of Gas, giving only 1-inch back pressure, or 1500 cubic feet per diem per cubic foot gross area.

NOTE.—Since Improvements patented in 1895-1897, 65 MACHINES, equal to a daily capacity of

688,400,000 CUBIC FEET,

Have been erected, or are at present on order.

WORKS:

Telegrams: "HOLMES, HUDDERSFIELD."

Turnbridge Foundry, and Whitestone Iron-Works,

HUDDERSFIELD.

London Office: 80, CANNON ST., E.C. *Telegrams:* "IGNITOR."

Telephone No. 103. Telegraphic Address: "ELEVATOR, HASLINGDEN."

S. S. STOTT & CO.,

ENGINEERS, HASLINGDEN, NR. MANCHESTER.

COAL AND COKE ELEVATORS & CONVEYORS.

COAL AND COKE STORAGE PLANTS.

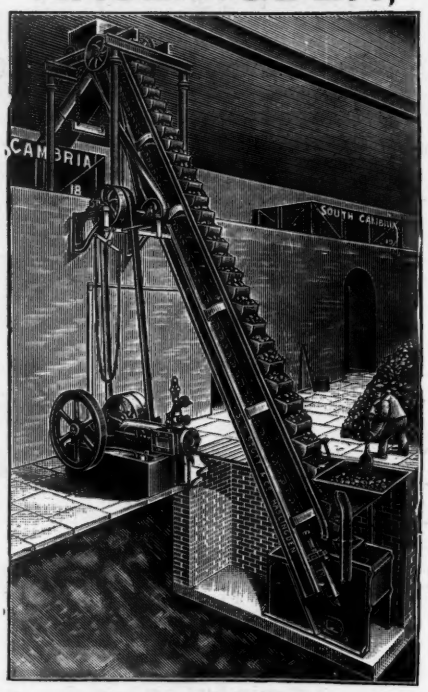
COAL AND COKE BREAKERS.

WHARF ELEVATORS FOR UNLOADING BARGES.

ELEVATORS & CONVEYORS for BOILER-HOUSES.

STAMPED AND RIVETED STEEL ELEVATOR BUCKETS.

DETACHABLE CHAINS AND SPROCKET WHEELS.



Coke Elevator Loading Railway Waggons.

LIME AND OXIDE ELEVATORS & CONVEYORS.

HIGH-CLASS STEAM-ENGINES up to 1000-Horse Power.

PUMPS, HORIZONTAL AND VERTICAL, SINGLE, DOUBLE, or THREE-THROW, for WATER-WORKS, &c.

BEAM PUMPING-ENGINES.

AIR-COMPRESSORS.

BELT PULLEYS, ROPE PULLEYS, GEARING, &c., &c.

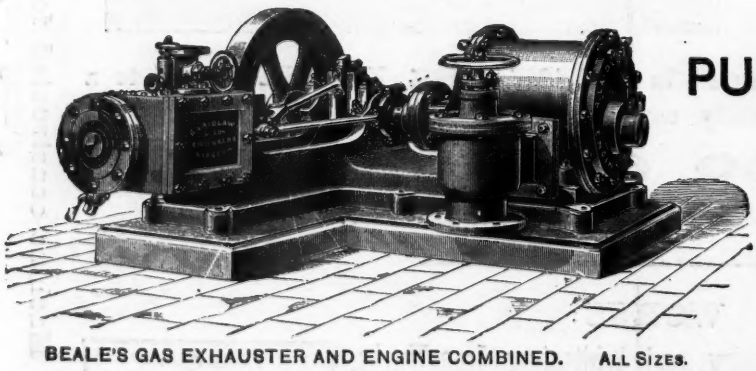
R. LAIDLAW & SON,

ENGINEERS & IRONFOUNDERS,

CAST-IRON PIPES

ALL SIZES.

MANUFACTURERS OF STEAM-ENGINES, EXHAUSTERS, VALVES, AND PUMPING-ENGINES.



BEALE'S GAS EXHAUSTER AND ENGINE COMBINED. ALL SIZES.

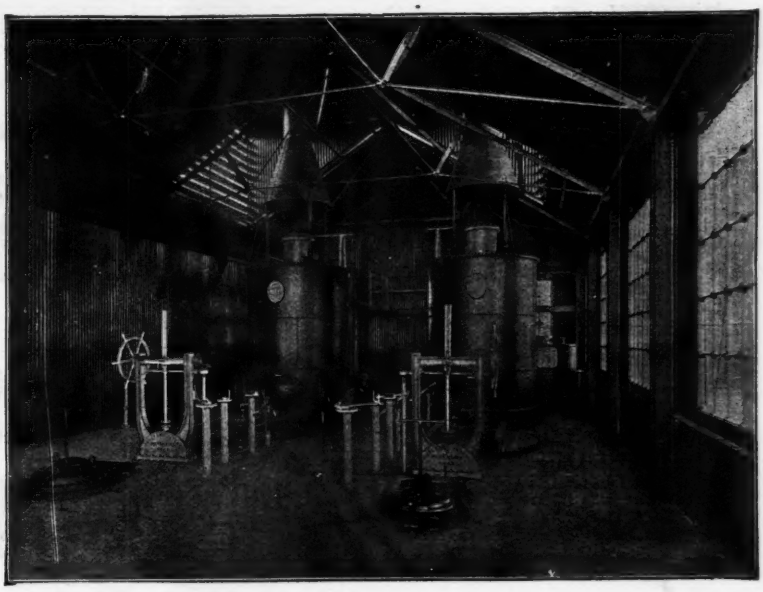
ALL KINDS OF GAS AND WATER APPARATUS.

ALLIANCE FOUNDRY, GLASGOW. | SIMON SQUARE WORKS, EDINBURGH. | 6, LITTLE BUSH LANE, LONDON, E.C.

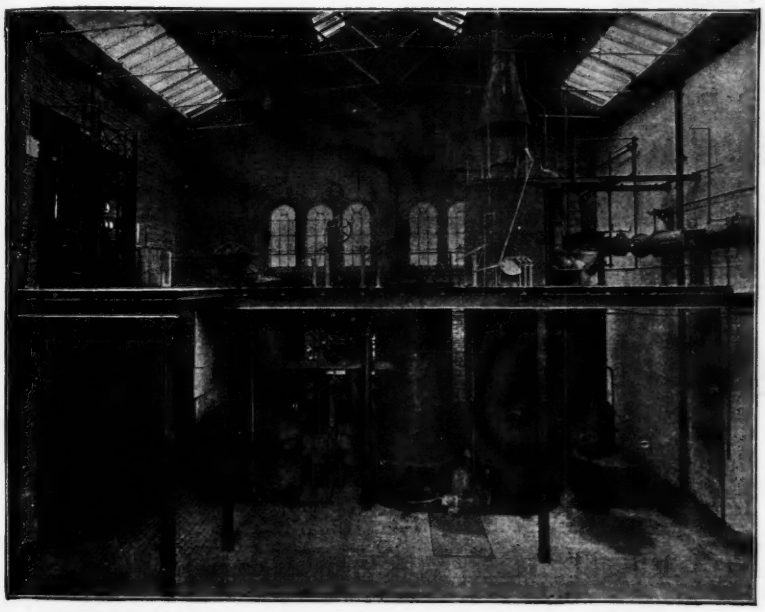
S. Cutler & Sons,
Millwall, London.

GASHOLDERS.

CARBURETTED WATER-GAS PLANT.



Water-Gas Plant at Southall.



Water-Gas Plant at Folkestone.

Carburetted Water-Gas Installations.

HORNSEY.
HASTINGS.
BUENOS AYRES.
SOUTHEND.
PLYMOUTH.
SOUTHALL.
HARROW.
HORSHAM.
FOLKESTONE.
BEXHILL.

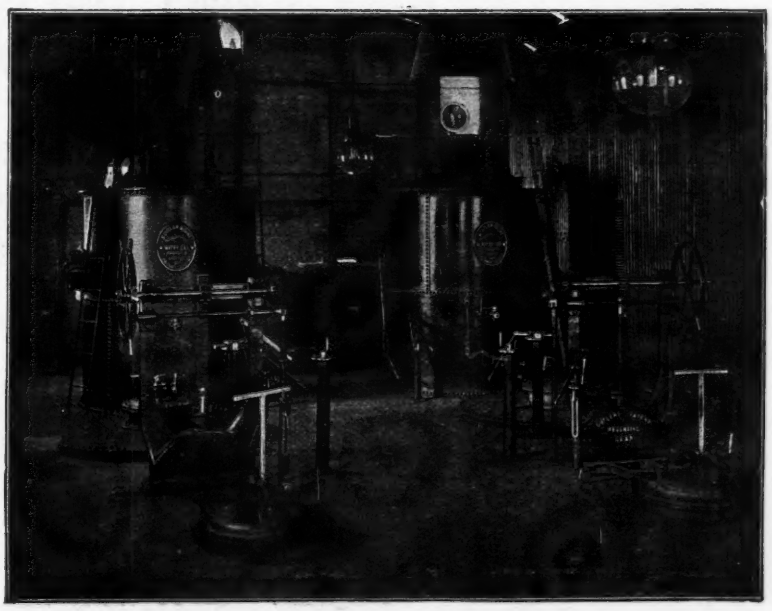
SOUTHEND (2nd Order).
PLYMOUTH (2nd Order).
SOUTHALL (2nd Order).
FOLKESTONE (2nd Order).

CUTLER'S PATENT GUIDE-FRAMING FOR GASHOLDERS

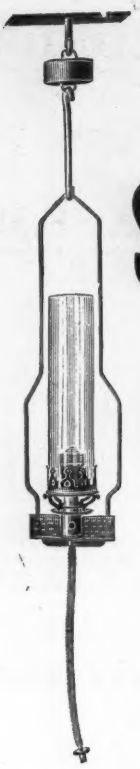
ADOPTED FOR
MANY IMPORTANT
GASHOLDERS.

OIL-TANKS.

EVERY DESCRIPTION OF
GAS-WORKS APPARATUS.



Water-Gas Plant at Southend.



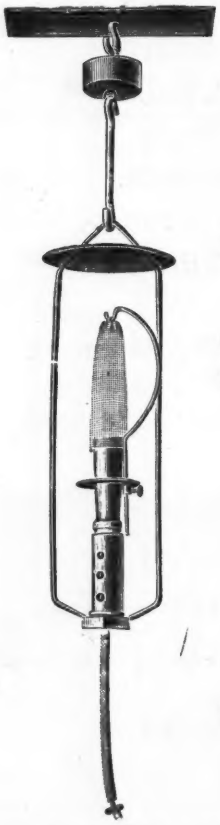
THE ONLY SUCCESSFUL SYSTEM

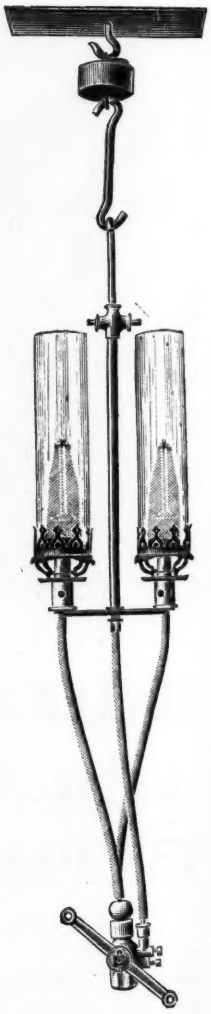
OF FIXING

INCANDESCENT GAS-LIGHTS IN STREET-LAMPS.

The AVIL System has proved a great success, and has been largely adopted.

It has been in use in Bradford for over Four Years.





TIME PROVES ALL THINGS;

And it has undoubtedly proved the efficiency of the AVIL System all over the Country.

Testimonials have been received from Bradford, Huddersfield, Coventry, Macclesfield, and many other large Towns and Cities.

OUR FRAMES ARE MADE SUITABLE FOR ANY OF THE WELSBACH COMPANY'S OR DENAYROUZE BURNERS.

Success Guaranteed in all Positions.

We hold the Original Patents.

For Illustrated Catalogue, apply to

The Anti-Vibration Incandescent Lighting Co., LIMITED,

12 & 14, WESTGATE ARCADE, BRADFORD.

Telegrams: "CANDESCENT, BRADFORD."

The **COLUMNS** or Standards **OF GASHOLDERS,** as every Gas Engineer knows, are a very large item in the cost of Storage. This expenditure is **QUITE USELESS** and unnecessary now that the guiding of a Gasholder can be done so safely and satisfactorily by means of **STEEL CABLES.** Six well-known Gas Companies have actually taken down the old-fashioned method of Guiding, and have **SUBSTITUTED** the Cable System. They are now able to work their Holders, which previously gave endless trouble. This fact should prove to others who desire to be up to date that **STANDARDS,** although they have served their purpose for a great number of years, are by no means a necessity, but rather a wasteful extravagance, and in more than 60 Gasholders have been **SUPERSEDED.**

ASHMORE, BENSON, PEASE, & CO., LTD.

STOCKTON-ON-TEES,

MANUFACTURERS OF

GASHOLDERS, PURIFIERS, SCRUBBERS, CONDENSERS, WASHERS, ROOFS, GIRDERS, SULPHATE PLANTS, VALVES, &c., &c.

London Office: 181, QUEEN VICTORIA STREET, E.C.

Telegrams: "Gasholder, Stockton-on-Tees." "Apparatus, London."

Paris Office: 3, SQ. DES BATIGNOLLES.

ARROL-FOULIS

PATENT HYDRAULIC MACHINERY

FOR

CHARGING AND DRAWING GAS-RETORTS

SIR WILLIAM ARROL & CO., Ltd., Sole Makers,
DALMARNOCK IRON-WORKS, BRIDGETON,
GLASGOW.

LONDON ADDRESS: 32 VICTORIA STREET, WESTMINSTER, S.W.

PLANS AND ESTIMATES FURNISHED ON APPLICATION.

THE
ARROL-FOULIS
MACHINES
Are Employed at the following Works—

GLASGOW GAS-WORKS—
Tradeston.
Dawsholm.
Dalmarnock.

GASLIGHT & COKE COMPANY—
Beckton.

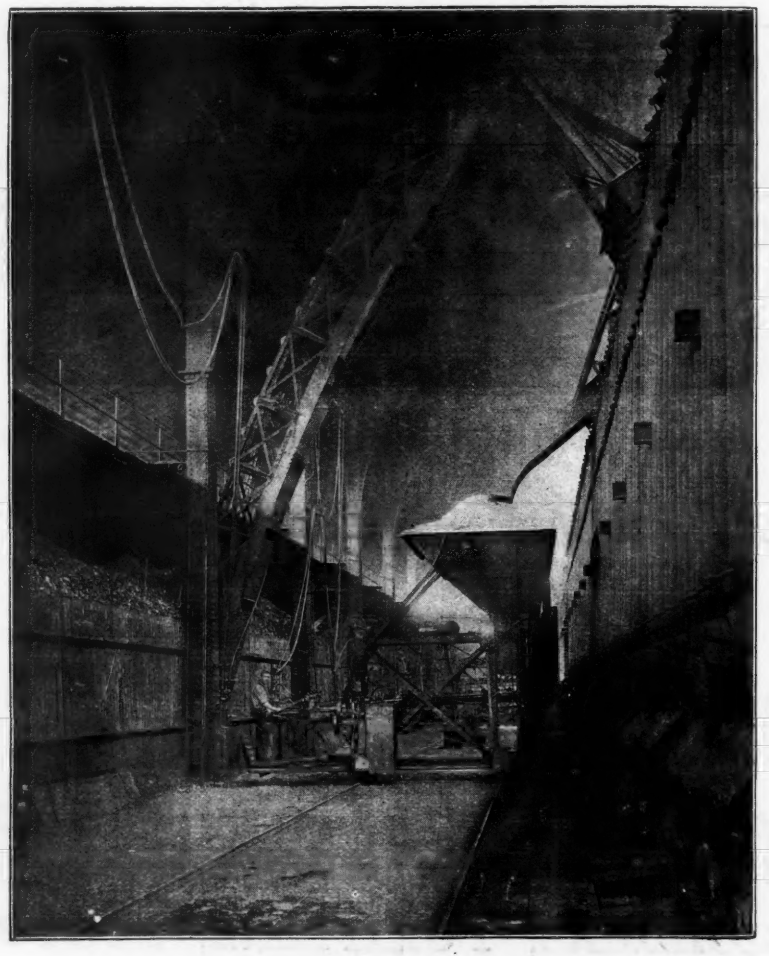
SOUTH METROPOLITAN GAS COMPANY—
East Greenwich
Vauxhall.
Rotherhithe.

COMMERCIAL GAS-WORKS—
Wapping.
Poplar.

BROMLEY GAS-WORKS (KENT).

EDINBURGH GAS-WORKS.

LIVERPOOL GAS-WORKS.



THE
ARROL-FOULIS
MACHINES
Are Employed at the following Works—

LEEDS GAS-WORKS.

BIRMINGHAM GAS-WORKS.

BRITISH GAS CO.—
Hull.

BOLTON GAS-WORKS.

IMPERIAL CONTINENTAL GAS ASSOCIATION—
Amsterdam.
Vienna.

HAGUE CORPORATION GAS-WORKS—
Hague.

METROPOLITAN GAS-WORKS—
Melbourne.

CLEVELAND GAS-WORKS—
Cleveland, Ohio,
&c., &c., &c.

OVER 200 MACHINES ARE AT WORK OR IN COURSE OF CONSTRUCTION.

BECKTON GAS-WORKS.

THE TIME TAKEN TO DRAW AND CHARGE EACH RETORT BY THESE MACHINES AVERAGES

ONE MINUTE.

THE SUNLIGHT INCANDESCENT GAS-BURNER

Applications for **AGENCIES** now being received.

NOTE THESE FEATURES:

A1. WHITE MANTLES.
Longest Lived and Highest Candle Power.

'SUNLIGHT' TINTED MANTLES.
Strongest and Pleasantest Colour.

These are INTERCHANGEABLE on same Burner.

BURNERS WITH CHIMNEYS.
Cheapest in the Market.

CHIMNEYLESS BURNERS.
Cheapest, Simplest, and Most Efficient.

SELF-LIGHTER.
Only Efficient System.

A great sensation with this unique combination of features is promised to our Agents for the coming season. Any firm of standing, applying early enough, will be very favourably dealt with.

An early visit to the London Show-Rooms is especially solicited.

SPECIAL NOTICE.

Sunlight Tinted Mantles have been declared by the Courts to be "as far asunder as the Poles" from the Welsbach System, and our Customers can rely on it that

SUNLIGHT WHITE MANTLES

also are NO Infringement of that or any other Patent, but are made under a Series of Independent Patents, and by an entirely New Process. This we definitely guarantee.

We give with every Mantle sold an absolute indemnity to both seller and user against all molestation on this account.

Price Lists, &c., on application.

New Sunlight Incandescent Co., Ltd.,

33 & 34, SHOE LANE, LONDON, E.C.

Telegrams: "IGNIFLUOUS." A.B.C. and A1. Codes used. Telephone: No. 94/ Holborn.

HISLOP'S PATENT REGENERATIVE RETORT-SETTINGS

These Settings are Testified to and guaranteed to produce **more Gas per day,** to be more **simple** in **Management,** to have **greater Durability,** to be **more Economical** in **Labour** and **Fuel,** and to have the **Lowest Cost for Renewals** of any system in the Market. Gas Engineers and Managers would do well to give these advantages their careful consideration, when contemplating extension of their Retort-Benches, or when filling existing Ovens.

Further Particulars from the Principal Agent, or from C. M. HAMILTON, Retort Builder, Hamilton, Agent for Scotland & Ireland.

NOTE: **The Agency held by Messrs. Drake & Son, Halifax, for England, Wales, and Abroad has now ceased; and they have no authority whatever to represent the Patentee, although persistently advertising themselves as Agents.**

All Enquiries to be addressed to R. F. HISLOP, Gas Engineer, CRAIGIELEA, PAISLEY.

INCLINED RETORTS

UP-TO-DATE FURNACES AND SETTINGS.

J. & H. ROBUS, 20, Bucklersbury, London, E.C.

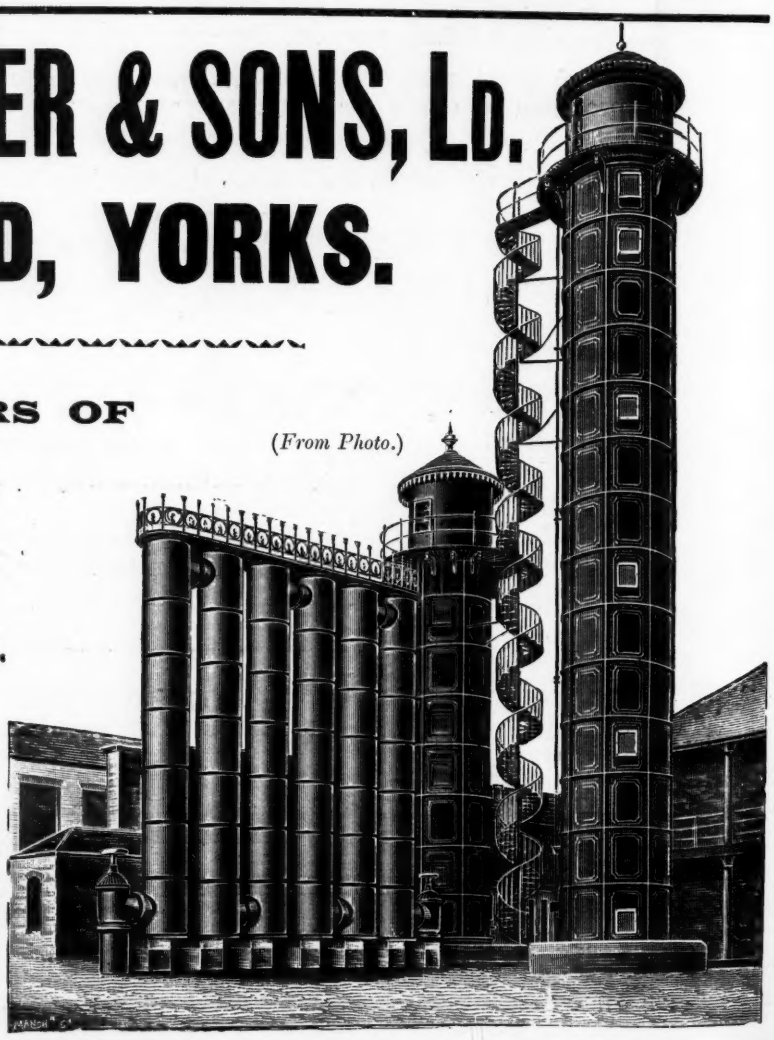
R. DEMPSTER & SONS, Ld. ELLAND, YORKS.

MANUFACTURERS OF

GAS PLANT

OF EVERY DESCRIPTION.

(*From Photo.*)



View illustrating Condensing and Scrubbing Plant erected for the Accrington Gas and Water Board by R. D. & Sons, Ltd.

C. HARRISON, Esq., Engineer.

MY

"DECISION" PORTABLE REGISTER

AND

PRESSURE & EXHAUST REGISTER

PRICE £7.

MAKE THE BEST DIAGRAMS.

DO NOT GET OUT OF ORDER.

WILL LAST A LIFETIME.

The Diagrams are in Ink, and are perfectly reliable.

Invaluable for obtaining reliable Diagrams of Pressures.

PRICE LIST,

APPARATUS HAVING—

6-inch	Range .	£8 10 6
8-inch	do. .	£9 10 6
12-inch	do. .	£10 10 6

DIAGRAMS ON APPLICATION.

Improved Street Lighting.

A Catalogue is in course of preparation showing the latest and most improved System of Outdoor Lighting, and will be sent to any address on application being made to

THOS. G. MARSH,

EXAMINER BUILDINGS, MANCHESTER.

J. & J. BRADDOCK

(BRANCH OF METERS LIMITED),

Globe Meter Works, OLDHAM.

Telegrams: "BRADDOCK, OLDHAM." National Telephone No. 254.

AND 45 & 47, WESTMINSTER BRIDGE ROAD, LONDON, S.E.

Telegrams: "METRIQUE, LONDON." Telephone No. 248 HOP.

MANUFACTURERS OF

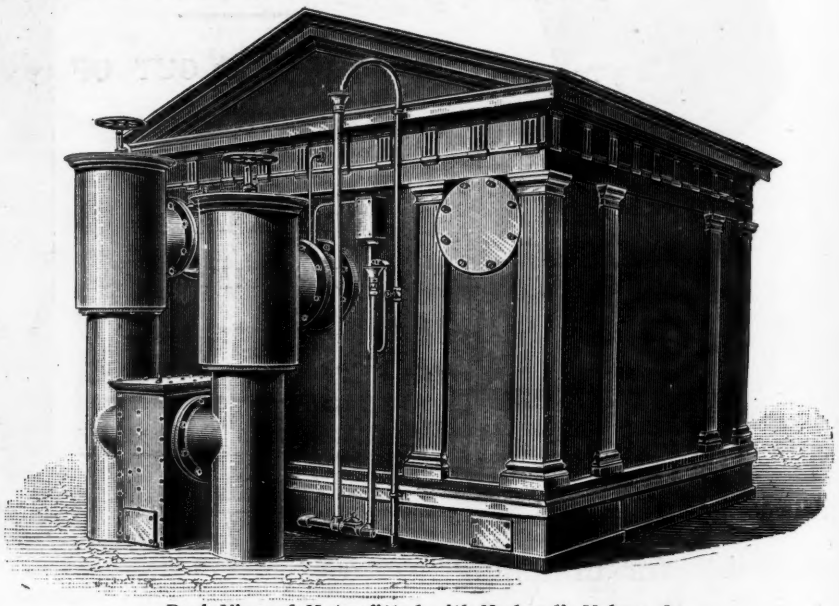
IMPROVED GAS STATION METERS

(OF ALL CAPACITIES UP TO 300,000 CUBIC FEET PER HOUR),

IN CYLINDRICAL AND RECTANGULAR CASES.

OF THE BEST QUALITY AND CONSTRUCTION.

PRICES AND PARTICULARS OF ANY SIZE UPON APPLICATION.



Back View of Meter fitted with Hydraulic Valves, &c.

BRADDOCK'S PATENT PENNY-IN-THE-SLOT

(ALSO SHILLING-IN-THE-SLOT)

PREPAYMENT WET AND DRY GAS-METERS.

STRONG AND RELIABLE. DURABLE AND SATISFACTORY.

NO DELICATE PARTS.

IMPROVED DRY GAS-METERS,

WITH "SEAMLESS" DIAPHRAGMS, IN THE

BEST CHARCOAL ANNEALED TIN-PLATE CASES

OF SUPERIOR DESIGN AND STRENGTH.

Thoroughly well made. **Accurate and Reliable.** **Unequalled for Soundness and Durability.**

BRADDOCK'S New Patent GAS STATION GOVERNOR

Which gives a Steady Outlet Pressure under all conditions.

Very Extensively Adopted. *Repeat Orders Received from London and Provincial Companies.*

CLAYTON SON & Co. LTD

MAKERS OF

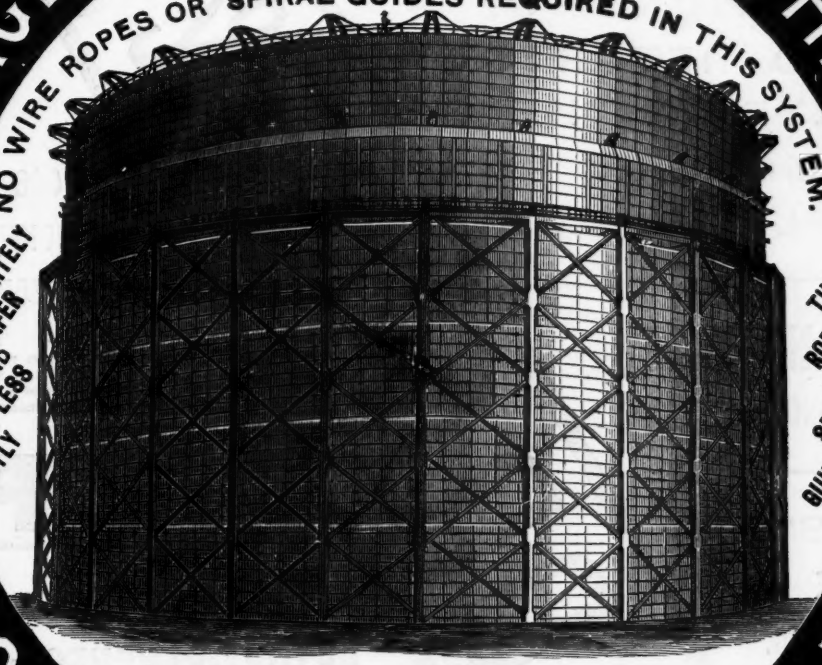
WORKS LEEDS

THE LARGEST GASHOLDER IN THE WORLD. i.e. CAPACITY 12 MILLION CUBIC FT.

GASHOLDERS OUR SPECIALITY

NO WIRE ROPES OR SPIRAL GUIDES REQUIRED IN THIS SYSTEM.

INFINITELY SAFER AND FAR LESS COSTLY THAN ROPES OR SPIRAL GUIDES.



ERECTED AT EAST GREENWICH FOR THE South Metropolitan Gas Company
IT HAS SIX LIFTS 30 FT DEEP EACH AND IS 300 FT DIAR

MAKERS OF GAS PLANT OF EVERY DESCRIPTION

ROOFS PURIFIERS &c. ALSO

ADDRESS LONDON 60, QUEEN VICTORIA ST.

TELEGRAPHIC "GAS, LEEDS."

GASHOLDERS OF ANY SIZE

ERECTED & COMPLETED WITHIN 12 MONTHS AND AT THE TIME SPECIFIED

MAKERS OF HIGH-CLASS

BOILERS.

Telephone No. 43.
HALIFAX EXCHANGE.
Telegraphic Address:
"DRAKESON HALIFAX"

LONDON OFFICE:
34, VICTORIA ST.,
S.W.

JONAS DRAKE & SON

GAS ENGINEERS,
IRONFOUNDERS,
AND CONTRACTORS,

OVENDEN,
HALIFAX.

CARBONIZING PLANT SPECIALISTS

INSTALLATIONS OF INCLINED RETORTS COMPLETE ON THE MOST MODERN PRINCIPLE.

RETORT-HOUSES
DESIGNED AND BUILT.

IMPROVED HISLOP'S REGENERATIVE FURNACES.

ERECTORS OF
RETORT-BENCHES AND IMPROVED SETTINGS, WITH GENERATOR OR REGENERATOR FURNACES.

SELF-SEALING & ORDINARY MOUTHPIECES. RETORT-LIDS.
HYDRAULIC & FOUL MAINS.
CONDENSERS, SCRUBBERS, PURIFIERS,
VALVES, SPECIAL CASTINGS, GIRDERS,
ROOFS, TANKS, COLUMNS, FLOOR-PLATES,
CHARGING-SHOOTS, &c., &c.
FURNACE FITTINGS AND RETORT MOUNTINGS.

TROTTER, HAINES, & CORBETT,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Proprietors of
BEST GLASSHOUSE POT & CRUCIBLE CLAY.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: R. CULL, 34, OLD BROAD STREET, E.C

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.
Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.
Telegrams: "DARWINIAN, MANCHESTER." Telephone 1806.

WELDON MUD
FOR
GAS PURIFICATION.
For use in the
RECOVERY OF SULPHUR,
ALSO
Removal of last Traces of SULPHURETTED HYDROGEN in catch position.

Full Particulars on application to the Patentees:
GAS DESULPHURIZATION CO.,
— LIMITED, —
1, FENCHURCH AVENUE, LONDON, E.C.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for
CANNEL & COAL.

TYNE BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	17·8 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft
Illuminating Power	16·3 candles.
Coke	73·1 per cent

For Prices and complete Analysis, apply to
THOS. W. DANCE & SONS
COAL OWNERS, NEWCASTLE-ON-TYNE;
OR
E. FOSTER & CO.,
21, JOHN STREET, ADELPHI, LONDON, W.C

UNEQUALLED.
Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.
QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH N.B.

BOLDON GAS COALS.

ANALYSIS.

Yield of Gas per Ton.	10,500	Cubic Feet.
Illuminating Power	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

For Prices, &c., apply to
W. H. PARKINSON,
THE HARTON COAL CO., LTD.,
NEWCASTLE-ON-TYNE.
Telegraphic Address: "PARKINSON, NEWCASTLE.

THORNLEY GAS COALS
WORKED BY THE
WEARDALE IRON & COAL Co., Ld.
OUT OF THEIR
THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by
Messrs. J. & H. S. PATTINSON, *May 28, 1895.*

Yield of Gas per Ton	10,500 Cub. Ft.
Illuminating Power	16·9 Candles.
Coke (of good quality)	67·5 per Cent.
Sulphur	0·58 ,,
Ash	2·73 ,,

For Price, &c., apply to the
WEARDALE IRON & COAL Co., Ld.
QUAYSIDE, NEWCASTLE-ON-TYNE.

THOMAS TURTON AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.
LONDON OFFICE
90, CANNON STREET, E.C.

WELLS' LIGHTNING PAINTER
LIME AND COLOUR WASHER.
(WALLWORK & WELLS' PATENTS.)
PAINTING BY MACHINE.
GREAT SAVING IN TIME,
PAINT, AND LABOUR.

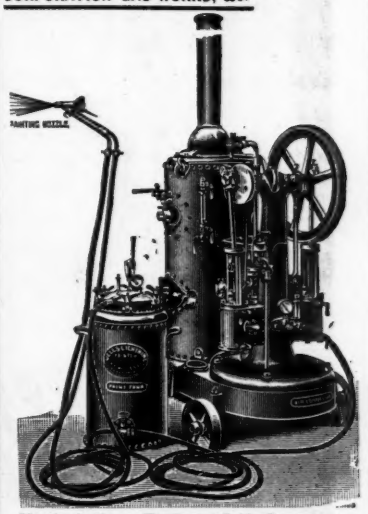
Painting Speed—3 Square Yards a Minute. Lime-Wash Speed—12 Square Yards a Minute.

Paint Machine, attached to a Single Air-Compressor, Driven by Belt Power. Can also be driven from existing Air-Mains.

No. 1	Painter	£25	Single Air Compressor	£17 10
No. 2	,,	£30		
No. 3	,,	£35	Double ditto	£27 0

OVER **250** SOLD.

As supplied to the following—
THE GASLIGHT AND COKE COMPANY, THE SOUTH METROPOLITAN GAS COMPANY, THE GLASGOW, BIRMINGHAM, PRESTON, BURSLEM, WARRINGTON, LIVERPOOL, NOTTINGHAM, OLDHAM, STOCKPORT, AND WEST BROMWICH CORPORATION GAS-WORKS, &c.



Vertical Steam-Engine and Air-Compressor combined with Boiler on Wheel Base.

Price £100.
Larger size Engine, &c., adapted for working up to 4 Machines . . . £180.
Painting Machines Extra.

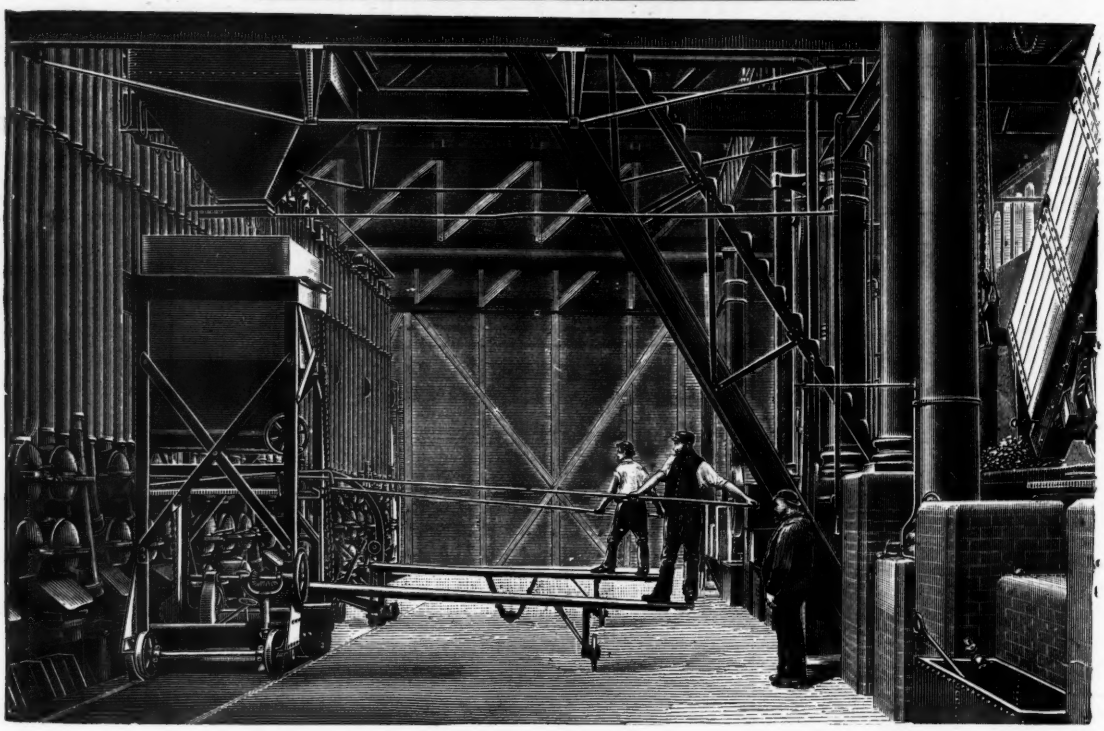
A. C. WELLS & CO. 113, Midland Rd., St. Pancras, **LONDON.**
Works: CHEETHAM, MANCHESTER.

WEST'S GAS IMPROVEMENT CO., LTD.

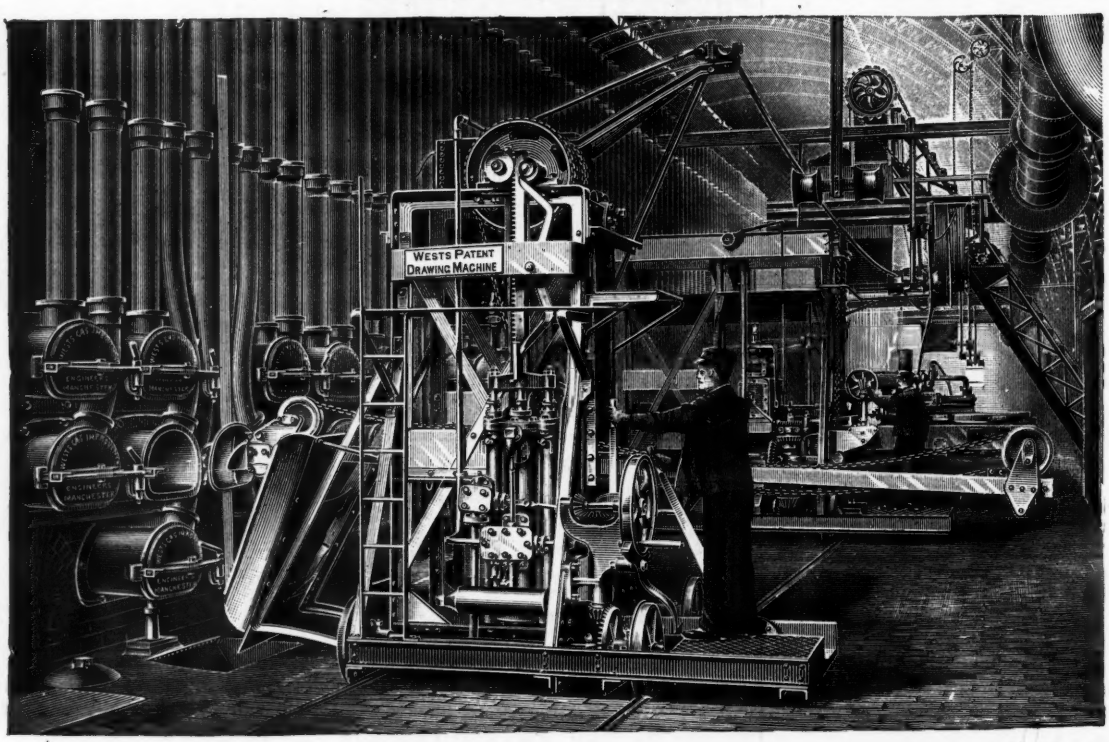
ALBION IRON-WORKS, MILES PLATTING,

MANCHESTER;

And 104, Queen Victoria Street, London, E.C.



West's Manual Charging and Drawing Machines.



West's Compressed-Air Drawing and Charging Machines.

Contractors for

WEST'S REGENERATOR SETTINGS & RETORT-HOUSE PLANT.

Some of the Gas-Works and Local Authorities using Crosbie's Manufactures.

Aberdovey	Clitheroe
Abergavenny	Cobham
Airedale	Coleshill
Aldridge	Collingham
Alfreton	Colney Hatch
Antrim	Colombo
Armagh	Coventry
Ascot	Cranbrook
Audley	Cullen
Aylsham	Deddington
Ballymena	Dewsbury
Ballyshannon	Dover
Beaumaris	Downpatrick
Bentham	Droitwich
Bewdley	Durban
Biddulph	Dursley
Bideford	East Ardsley
Birmingham	Eastbourne
Blackburn	Elland
Blackwell	Ellesmere
Bognor	Ellstree
Bollington	Ennis
Boreham	Eye
Bournemouth	Farnham
Bradley Green	Felixstowe
Bramham	Flint
Brandon	Garn
Bridgnorth	Garston
Broadgreen	Garw
Broadstairs	Gillingham
Bromsgrove	Gorey
Broughty Ferry	Halesowen
Builth	Hanley
Burton	Hendon
Buxton	Hereford
Calne	Hinckley
Canncck	Holywood
Cape Town	Honiton
Carlow	Hoylake
Castleford	Huddersfield
Chester-le-Street	Huelva
Chesterton	Huntingdon
Chipping Wycombe	Hythe
Cleveland	Ilkeston
	Irthlingboro'

PAINTS FOR GAS-WORKS. PAINTS FOR GASHOLDERS.

Contractors to Her Majesty's Government, the Indian Government, the Natal Government, the Turkish Government, the Netherlands Railway, the London County Council, &c., &c.

CROSBIE'S PAINTS.

Guaranteed genuine and free from adulteration, and specially made to withstand Gaseous Fumes.

Catalogue and Testimonials on Application.

ADOLPHE CROSBIE, LTD.,

COLOUR WORKS, WOLVERHAMPTON.

Some of the Gas-Works and Local Authorities using Crosbie's Manufactures.

Johannesburg	Richmond
Kegworth	Rochester
Kildwick	Roscommon
Kilrush	Rugeley
Kineton	Sandgate
Kirkburton	Scarborough
Knutsford	Seaham Harbour
Leamington	Seisdon
Ledbury	Shifnal
Leek	Shipston-on-Stour
Leven, N.B.	Sidmouth
Limerick	Skibbereen
London	Slough
Loughborough	Southam
Lymington	Southend
Machynlleth	Stafford
Merthyr Tydfil	St. Albans
Milborne Port	Stamford
Minster	Storrington
Monte Video	Strood
Napier (N.Z.)	Stroud
New Mills	Sudbury
Newnham	Swinton
North Middlesex	Tetbury
Odiham	Tokio
Ogmore	Uppingham
Outlane	Uttoxeter
Parsonstown	Ventnor
Pembroke	Warwick
Penmaenmawr	Wexford
Pietermaritzburg	Wigston
Portadown	Willenhall
Port Elizabeth	Witney
Portrush	Wollaston
Portsmouth	Wolverhampton
Pwllheli	Workington
Ramsey	Wotton
Raunds	

THE

MAXIM PATENT CARBURETTOR

FOR ENRICHING GAS IN BULK.

OVER 60 MAXIM PATENT CARBURETTORS HAVE NOW BEEN FIXED.

Among the Companies supplied are The Gas Light and Coke Company, The South Metropolitan Gas Company, Birmingham Corporation, Manchester Corporation, Rochdale Corporation, Bristol Gas Company, and many other Works, both large and small, where they have been working in some instances for the past **Seven Years.**

MORE GAS & SALEABLE COKE PER TON of COAL CARBONIZED is PRODUCED; SAVING CAPITAL, LABOUR, FUEL, WEAR & TEAR, &c.

THE ENRICHMENT IS INSTANTANEOUS AND PERMANENT.

The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.

SOLE AGENTS FOR REDWOOD & CLOWES' INFLAMMABLE VAPOUR & GAS DETECTORS.

Dealers in Carburine and all other Naphthas and Oils suitable for the Enrichment of Gas.

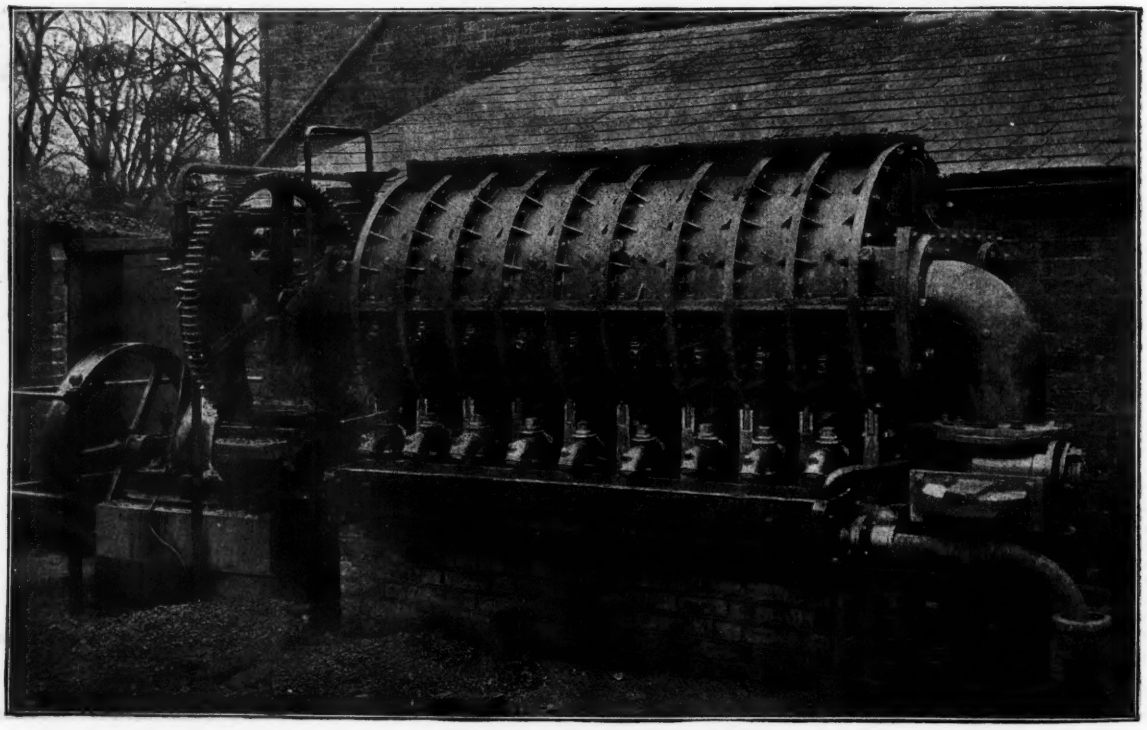
For Prices and full Particulars, apply to

THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED,

18, DEVONSHIRE STREET, BISHOPSGATE LONDON, E.C.

KIRKHAM, HULETT, & CHANDLER, LTD.,

PATENT "STANDARD" WASHER-SCRUBBER.



EXTRACTS **ALL** THE AMMONIA AND LARGE PROPORTION OF CO_2 AND H_2S.

NOTE: Particular attention is drawn to the fact that these Machines extract **ALL** the Ammonia, and that the strength of Liquor obtained depends on the class of Coal Carbonized and quantity of Water used.

Old Machines Fitted with Latest Improvements at Small Cost. Suitable for large and small Works. The above represents latter class of Machine. Photos. of larger Machines on application.

Over 560 in use, amongst the number being:–

45 Patent "STANDARD" WASHER-SCRUBBERS in use in London.
18 Patent "STANDARD" WASHER-SCRUBBERS in use in Paris.
7 Patent "STANDARD" WASHER-SCRUBBERS in use in Berlin.
9 Patent "STANDARD" WASHER-SCRUBBERS in use in Liverpool.
7 Patent "STANDARD" WASHER-SCRUBBERS in use in Bradford.
6 Patent "STANDARD" WASHER-SCRUBBERS in use in Leeds.
6 Patent "STANDARD" WASHER-SCRUBBERS in use in Nottingham.
3 Patent "STANDARD" WASHER-SCRUBBERS in use in Manchester.
3 Patent "STANDARD" WASHER-SCRUBBERS in use in Birmingham.

(Amongst Machines in hand at present date are 7 for erection. at some of above Works.)

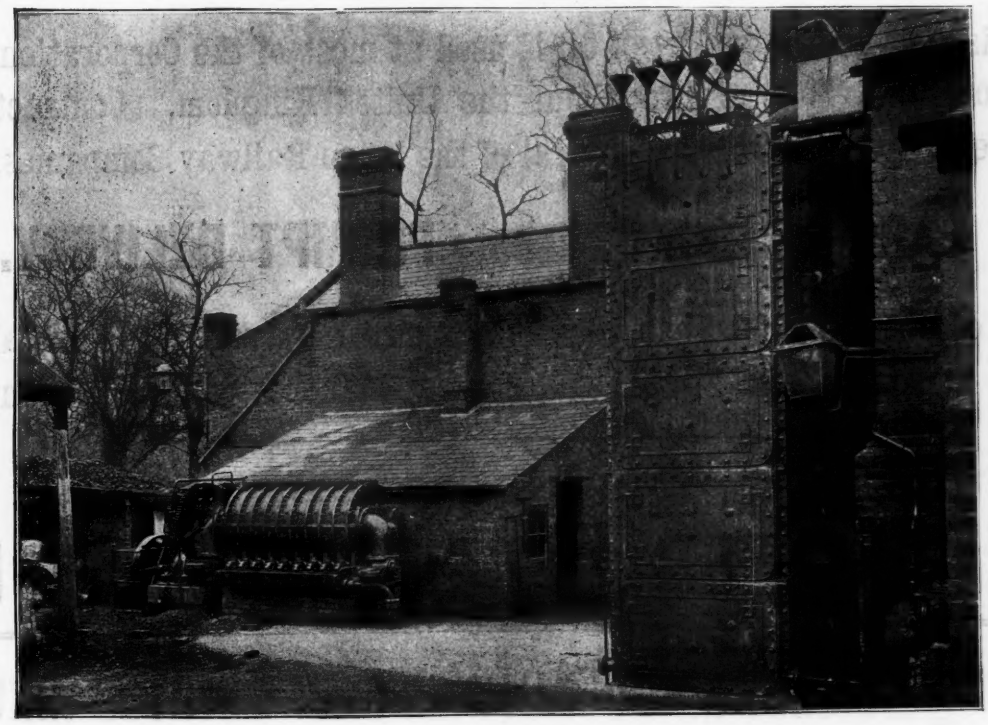
ADDRESS: *3 & 4, Palace Chambers, Bridge St.,*
WESTMINSTER, S.W.

KIRKHAM, HULETT, & CHANDLER, LTD.,

PATENT "STANDARD" WASHER-SCRUBBER

AND

PATENT "STANDARD" CONDENSER.



THE PATENT "STANDARD" CONDENSER

Slow Speed—Large Area for Passage of Gas and Water—Easy access to every Part—No Choking up of Gas or Water Passages—Economy in Water Used—Small Ground Area—Efficient Control.

3 Patent "STANDARD" CONDENSERS in use at Coventry.
2 Patent "STANDARD" CONDENSERS in use at Scarborough.
1 Patent "STANDARD" CONDENSER in use at Herne Bay.
1 Patent "STANDARD" CONDENSER in use at Cette.
1 Patent "STANDARD" CONDENSER in use at Barking.
1 Patent "STANDARD" CONDENSER in use at Pinner.
1 Patent "STANDARD" CONDENSER in use at Pelton Colliery.
1 Patent "STANDARD" CONDENSER in use at Tuborg.
1 Patent "STANDARD" CONDENSER in use at Randers.
1 Patent "STANDARD" CONDENSER in use at Elsinore.
(Others in hand for Antwerp, Randers, &c.)

ADDRESS: *3 & 4, Palace Chambers, Bridge St.,*
WESTMINSTER, S.W.

AMERICAN GAS OIL

SOLE IMPORTERS—

ANGLO-AMERICAN OIL COMPANY, LIMITED,

This well-known quality of Oil is used at most of the Corporation Works and Companies' Works throughout the United Kingdom. Contracts have also been entered into with several of the large Railway Companies.

LARGE STOCKS. PROMPT DELIVERY.

Stock of about 30,000 Tons is usually carried by us at our Installations at Avonmouth, Birkenhead, Barrow, Manchester, and London.

HEAD OFFICE:

22, BILLITER STREET, LONDON, E.C.

LARGEST MANUFACTURERS IN THE UNITED KINGDOM OF GAS-RETORTS,

HORIZONTAL or INCLINED; also Makers of SEGMENTAL RETORTS of all SECTIONS.

PATENTEES OF
MACHINE-FLANGED RETORTS

B. GIBBONS, JUNR., LTD.,

TELEPHONE No. 8010.

DIBDALE WORKS DUDLEY.

Telegraphic Address: "MACHINE, LOWER GORNAL"

SPECIAL BRICKS and BLOCKS of every description for GENERATOR and REGENERATOR FURNACES.

"ABC" Code and UNICODE used for Telegrams and Cablegrams.

Large Stocks of Bricks of all sizes, Burrs, Boiler Seating Blocks and Covers, Plain and Rebated Tiles, &c., &c.

RETORTS and other FIRE-CLAY GOODS CAREFULLY PACKED for EXPORT.

FOREIGN and HOME COPIES of ILLUSTRATED CATALOGUES on Application.

The Eagle Range & Gas-Stove Co., Limited,

AMALGAMATION OF

ARDEN HILL & CO., LTD., and The Eagle Range & Foundry Co., Ltd.

CONTRACTORS to H.M. GOVERNMENT and the CROWN AGENTS for the COLONIES.

GAS-STOVE MANUFACTORY: ACME GAS-STOVE WORKS, SALFORD ST., ASTON, BIRMINGHAM.

RANGE MANUFACTORY: EAGLE WORKS, CATHERINE STREET, ASTON, BIRMINGHAM.

SHOW-ROOMS: 127, Regent Street, London, W.; 58, St. Paul's Churchyard, London, E.C.; 2, St. Augustine's Parade, Bristol; 65, Stretford Road, Manchester.

THE MASTER PATENT

"ACME"

GAS COOKERS

ARE SUPERSEDING ALL OTHERS.

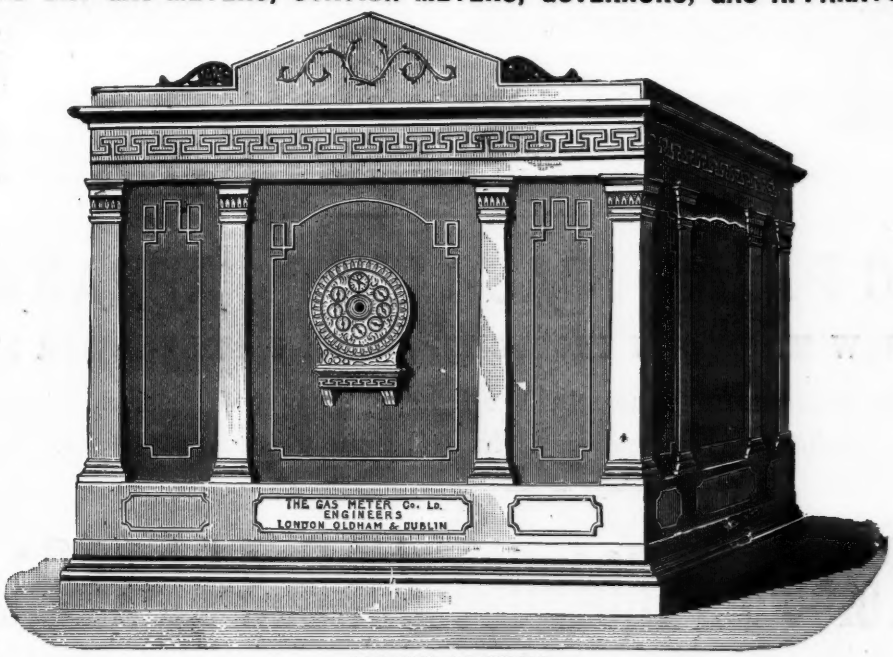
SAMPLE SENT ON APPLICATION.

THE GAS-METER COMPANY,

MANUFACTURERS OF LIMITED,

WET AND DRY GAS-METERS, STATION METERS, GOVERNORS, GAS APPARATUS, ETC.

SQUARE STATION METERS WITH PLANED JOINTS.



STATION METERS IN CYLINDRICAL CASES.

DESIGN No. 2 PATTERN.

STATION METERS MADE AT THE COMPANY'S WORKS, OLDHAM (Late WEST & GREGSON). Established 1836.

Prices and Particulars apply to

R. L. ANDREWS, General Manager.

Works: 238, KINGSLAND ROAD, LONDON; UNION STREET, OLDHAM; HANOVER STREET, DUBLIN.

Telegraphic Address "METER."

[See Advertisement on back of Wrapper.

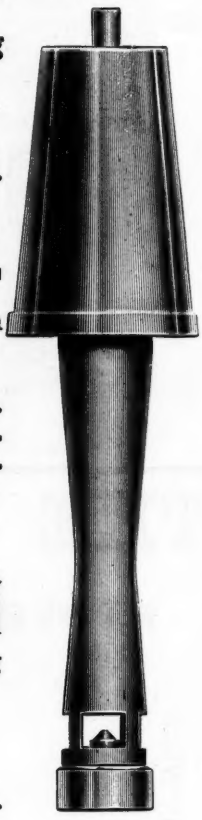
WELSBACH INCANDESCENT GAS-LIGHT.

NEW WELSBACH BURNERS.

25 Candles per Cubic Foot of Gas.

For STREET LIGHTING there is nothing to excel the New Welsbach Burner as shown at Niagara Hall, London, and in the principal Provincial Towns.

The New Welsbach Burner is supplied in SIX Sizes, consuming from ¾ to 7 Cubic Feet of Gas per Hour.



For Street Lighting, the sizes recommended are Nos. 2, 3, & 4.

100 CANDLE POWER WITH 4 CUBIC FEET OF GAS.

To obtain a light of 100 Candles for 4000 hours with Gas at 2s. 3d. per 1000 Cubic Feet would cost—

With an Ordinary Gas-Burner	£18 0s.
With a new Welsbach Burner	£1 16s.
With an Incandescent Electric Lamp, at 5d. per unit	£30 0s.

THE

New Welsbach Anti-Vibration Attachment

Enables the New Welsbach Burner to be used for Street Lighting or otherwise, notwithstanding the severest vibration.

Made of Metal throughout.

Simple, Durable, Inexpensive.

Does not obstruct the Light.

HYDRO-PRESS GAS-LIGHT APPARATUS.

THE NEW METHOD OF PRODUCING A HIGH CANDLE-POWER LIGHT.

Especially recommended for use in Workshops, Railway Yards, and Open Spaces, where a high-power light from one centre is desired.

The Welsbach Incandescent Gas-Light Co., Ltd.,

York Street and Palmer Street, WESTMINSTER,

LONDON, S.W.

ALEX. C. HUMPHREYS, M.E.
A. G. GLASGOW, M.E. } MM.Inst.C.E.

SINCE 1893

MESSRS. HUMPHREYS & GLASGOW

Have constructed or have in hand

CARBURETTED WATER-GAS PLANT

FOR THE FOLLOWING UNDERTAKINGS:—

American construction is instanced only when from the LONDON Designs of Messrs. Humphreys & Glasgow.

	Cub. Ft. Daily.		Cub. Ft. Daily
Copenhagen	700,000	Commercial Gas Co.	850,000
Copenhagen (Second Contract)	2,500,000	Commercial (Second Contract)	850,000
Belfast	1,700,000	Commercial (Third Contract)	1,250,000
Belfast (Second Contract)	4,500,000	Croydon	1,250,000
Brussels	700,000	L. & N.W. Railway, Crewe	700,000
Brussels (Second Contract)	700,000	Taunton	225,000
Liverpool	3,500,000	Lawrence, Mass.	400,000
Liverpool (Second Contract)	4,500,000	Rotterdam	850,000
Tottenham	750,000	Dorking	125,000
Tottenham (Second Contract)	750,000	McKeesport, Pa.	500,000
Santiago de Cuba	400,000	The Gaslight and Coke Co., Bromley	3,750,000
Swansea	750,000	The Gaslight and Coke Co., Nine Elms	2,750,000
Manchester	3,000,000	Durham	200,000
Brighton	1,750,000	New York (Remodelled)	11,000,000
Preston	1,500,000	Scarborough	800,000
New York	1,200,000	Perth, W.A.	125,000
Southport	750,000	Bremen	550,000
Bath	1,000,000	Maidenhead	225,000
Newburgh, N.Y.	350,000	Epsom	225,000
Newburgh, N.Y. (Second Contract)	250,000	North Middlesex	150,000
Hoylake	125,000	Wandsworth and Putney	1,800,000
Coventry	600,000	Aarhus	800,000
Coventry (Second Contract)	600,000	Falmouth	150,000
Bordentown, N.J.	125,000	Southampton	800,000
Winchester	200,000	Hartlepool	750,000
Shanghai	225,000	Utrecht	1,000,000
Stockport	500,000	Deventer	150,000
Norwich	1,000,000	Portsmouth	1,000,000
Holyoke, Mass.	600,000	Bournemouth	1,000,000
Lea Bridge	350,000	Aylesbury	150,000
Lea Bridge (Second Contract)	350,000	Hamburg	1,750,000
Stockton-on-Tees	500,000	Dublin	2,000,000
St. Joseph, Mo.	750,000	Redhill	275,000
Edinburgh	2,000,000	Stockport (Second Contract)	500,000
Guildford	350,000	Brighton (Second Contract)	1,750,000
Brentford	1,200,000	Croydon (Second Contract)	625,000
Bridlington	125,000	Maidenhead (Second Contract)	225,000
Syracuse, N.Y.	850,000	The Gaslight and Coke Co., Beckton	2,250,000
Middlesbrough	1,250,000	The Gaslight and Coke Co., Fulham	1,750,000

The 1891 Installations of The Gaslight and Coke Co., 12,000,000 Cubic Feet Daily.

IN THE UNITED STATES, TO DEC. 31, 1898,

Messrs. Humphreys & Glasgow and their Colleagues The United Gas Improvement Company have jointly constructed 293 Sets of Humphreys Double-Superheater Apparatus (excluding earlier extensive construction of Single Superheater and "Combined" Apparatus) with a daily capacity of 219,550,000 cubic feet. **Of this volume, 56,875,000 cubic feet daily were undertaken during 1898.**

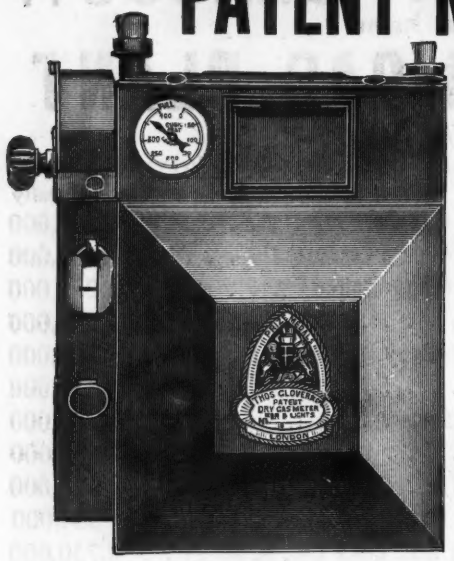
9, VICTORIA STREET, LONDON, S.W.

Telegrams: "EPISTOLARY, LONDON."

UNITED STATES OFFICE:

BANK OF COMMERCE BUILDING, NEW YORK.

THOMAS GLOVER & CO.'S
PATENT NEW IMPROVED
PREPAYMENT METER



For Pennies, Shillings, or any Coin.

Simple in Mechanism.
Positive in Results.
Price Changer *in Situ.*

GUARANTEED FOR FIVE YEARS.

Telegraphic Address: "GOTHIC, LONDON." Telephone No. 725, Holborn.

THOMAS GLOVER & CO., LTD.,
DRY GAS-METER MANUFACTURERS,
214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN, LONDON, E.C.

BRISTOL: 28, BATH STREET. *Telegraphic Address:* "GOTHIC." Telephone No. 1003.

BIRMINGHAM: 1, OOZELLS STREET. *Telegraphic Address:* "GOTHIC."

MANCHESTER: 37, BLACKFRIARS STREET. *Telegraphic Address:* "GOTHIC." Telephone No. 3398.

GLASGOW: ARGYLE WORKS, KINNING PARK. *Telegraphic Address:* "GASMAIN." Telephone No. 1525 South Side.

PARKINSON'S
PATENT
EQUILIBRIUM GOVERNORS.

A very large number are now at work; and all Engineers who have adopted them speak in unqualified terms of their great efficiency.

COUNTERBALANCE or AIR VESSEL, as desired.
FITTED WITH SIX COLUMNS and GIRDERS, WEIGHTS or WATER PRESSURE.

COTTAGE LANE WORKS, CITY ROAD, LONDON.
Telegrams: "INDEX."
Telephone No. 778 King's Cross.

BELL BARN ROAD WORKS, BIRMINGHAM.
Telegrams: "GASMETERS."
Telephone No. 1101.
[See Advt. p. IV., centre of "JOURNAL."

CONTENTS.

EDITORIAL NOTES:—

GAS, LIGHTING, &c.— PAGE

The Position of The Gas Institute 1631
Proposed Continental Excursion of the Institution of Gas Engineers 1632
The "Powers of Charge" Committee 1632
The Refusal of Prolongation for the Coze Patent 1632
A Trade Union Keeps Its Word 1633

WATER AND SANITARY AFFAIRS—

The Meetings of the Southwark and Vauxhall and Grand Junction Water Companies 1633
The Use of Flood Waters and the Biology of Sand Filtration . . 1634

THE INCORPORATED GAS INSTITUTE—

ANNUAL MEETING IN LONDON—

Review of Proceedings 1634
Report of Proceedings—
Confirmation of Minutes; Appointment of Scrutineers; The Report and Accounts; Awards of Premiums; President's Address 1636
Reading of Papers; The Institute and the Institution . . . 1637
The Benevolent Fund; Report of the Scrutineers; New Members; An Honorary Member; Place of Next Meeting . . . 1638
Votes of Thanks 1639
Lecture—
Carburetted Water Gas, with Reference to the Recent Report of the Departmental Committee. By A. G. Glasgow, of London. 1639
Paper and Discussion—
Differential Rates as between Consumers of Gas for Lighting and for Purposes other than Lighting. By Thomas Newbigging, of Manchester 1646

ESSAYS, COMMENTARIES, AND REVIEWS:—

Gas and Water Companies in the Stock Market 1652
Electric Lighting Memoranda 1652
The Renascence of High-Power Gas Lighting 1653
Workmen's Benefit Societies—An Answer to Some Criticisms . 1654

TECHNICAL RECORD:—

The Autumn Meeting of the Institution of Gas Engineers—Suggested Programme 1653
The Conference of the Institution of Civil Engineers—
Mr. M. W. Hervey on the Use of Filtered Flood Water . . . 1655
Mr. James Watson on the Rate per Head per Day 1657
British Association of Water-Works Engineers—The Annual Meeting in London—Dr. Ad. Kemna on the Biology of Sand Filtration 1658

CORRESPONDENCE:—

Municipal Trading 1651
The Lawson Tait Hot-Water Apparatus 1661

PARLIAMENTARY INTELLIGENCE:—

Progress of Bills 1661
House of Commons Select Committee—The Powers of Charge of the Metropolitan Gas Companies 1661
The Contest for the Derwent Watershed 1672

LEGAL INTELLIGENCE:—

Privy Council Office—The Petition for the Prolongation of the Inclined Retort Patent 1675
High Court of Justice—Chancery Division—Grand Junction Water-Works Company *v.* Hampton Urban District Council . 1676
Extension of the Tavistock Gas Company's District 1676
Claim under the Workmen's Compensation Act 1676

MISCELLANEOUS:—

Meeting of the Welsbach Incandescent Gas-Light Company, Limited 1677
Meeting of the Malta and Mediterranean Gas Company, Limited 1678
The Productive Undertakings of Bradford 1679
Southport Corporation Gas Supply—The Gas Engineer's Report 1679
Stafford Corporation Gas and Electricity Departments—Proposed Introduction of Profit-Sharing 1680
Hinckley Gas Supply—A Good Year 1680
East Dereham Gas-Works—The Dismissal of the Manager . . 1680
Gas *v.* Electricity for Street Lighting at Worcester 1680
Electric Lighting Notes 1681
The London County Council and the Water Question—Work for Next Session 1682
Gas and Water Companies' Stock and Share List 1682
Meeting of the Southwark and Vauxhall Water Company . . . 1683
Meeting of the Grand Junction Water-Works Company . . . 1684
Notes from Scotland 1686
Current Sales of Gas Products 1688
Coal Trade Reports 1689

PARAGRAPHS:—

OBITUARY: Mr. Francis Bassett; Dr. Lawson Tait 1655
PERSONAL: Mr. G. W. Broks; Mr. James Kay; Mr. John Fagg; Mr. Henry Peaty; Mr. Alfred J. Jenkins; Mr. Fletcher W. Stevenson, M.Inst.C.E. 1655
Société Technique du Gaz en France—A Gas Engine of 650-Horse Power 1634
Evaporative Condensation—The Condition of Carbon in Iron . 1651
A Correction—Iron and Steel Institute 1652
The Nation's Finances 1654
Evening Star Lodge 1655
Damage to Gas-Pipes at Carmarthen 1660
The Farnham District Council and the Gas-Works—Dispensing with Contractors 1661
Extensions at the Worthing Gas-Works—An Agreement for the Purchase of the Morecambe Gas-Works 1671
Winding up the Bridlington Water Company—Littlehampton Water-Works—Pembroke Water Supply—Foleshill and District Water Supply—The Main-Laying Troubles at Ormskirk . . 1674
Coventry Gas Profits—Sales of Shares 1676
Godalming Water Supply—The Colwyn Bay District Council and the Gas-Works—New Joint-Stock Companies 1681
Water-Rates in the Bolton District 1682
The Dry Weather and the Water Supply 1685
The Crediton District Council and the Gas-Works—Tonbridge Water Company—Machine Stoking *v.* Hand Labour at the Longton Gas-Works 1689
Bude and Stratton Water Supply—Brixham Water Supply—The Water-Works at Los Angeles 1690

EDITORIAL NOTES.

The Position of the Gas Institute.

THE meeting of the Gas Institute last week, under the presidency of Mr. Samuel Stewart, of Greenock, was the most successful, satisfying, and agreeable in all respects, in the history of the organization. Such was the unanimous opinion of all members and friends of the Institute attending, whose memory carries them back longest over the chequered experiences of the Association. Whether regard be had to the attendance at the sittings, the quality and amount of the technical fare provided, the spirit pervading the gathering, the conduct of the President in the Chair and at the social functions, or the excellent management of the business by the responsible officials of the Institute, the verdict upon the meeting of 1899 must remain the same. We are the more at ease in thus recording and endorsing the common sentiment, inasmuch as we have never shrunk from playing the thankless part, as regards any technical society connected with the gas industry, of the candid friend who tells people their faults. Reverting to our survey of the position of the technical organizations of the British gas industry four weeks ago, the proceedings of the past week have contributed materially to advance the solution of the problem then formulated. From the purely business point of view, the Gas Institute transactions were as strong as those of the Institution of Gas Engineers were weak. All human institutions must, in the long run, be judged by their practical results. So far as the national technical organizations of the British gas industry are concerned, they challenge comparison and compete for approval and support by the very circumstance of their occupying the same ground. Since last week, the burden of justification for the maintenance of the existing division between the rival Societies has shifted.

It was bluntly stated here a month ago that it was the atmosphere of the Gas Institute meetings that needed to be changed; and the change has now been effected, almost completely, and with apparent ease. We did not make that observation without warrant, nor without knowing the mind of the Council. By the simple expedient of asking trading firms to desist from the practice of sending "repre-" sentatives" to the meeting—a reasonable request, which was loyally obeyed—the Council stopped, once for all, a nuisance that had become intolerable. More than this, the evil of which the practice in question was only a symptom never showed itself at, or in connection with, the meeting. Never again, one may fairly hope, will members of the Institute so far misunderstand what is due to the dignity of the Society as to lend themselves to the getting up of subsidized treats and excursions. On Friday the river trip of the Institute was thoroughly enjoyable for many reasons, but especially for the check that so efficiently prevented the swamping of the rightful order of excursionists by those who had no proper claim to the privilege. We have every reason to believe that the thorough change that has come over the spirit of the Institute, the original character of which was plainly described, and not for the first time, in these columns a month ago, was warmly appreciated by all and sundry. The presence of "traders" at the meeting was shown to be quite compatible with the observance of a sufficiently high standard of application to, and realization of, the chief proper purposes of the assembly. If the "traders" did not contribute actively to the work of the Institute, at any rate they did not hinder it. Their participation in the fixture worked out precisely as we expected, as from the moment when the encouragement extended to the abuses of the old order of things was removed. "Traders" are not such fools as to go on very long with a played-out game.

The dramatic interlude of Wednesday morning, which those readers of these lines who were not present will find chronicled in its proper place, signalized the close of an incident in the history of the Institute and the Institution which has long ceased to have any active influence on the course of affairs. Still, the reconciliation of men who are in a sense public characters, and whose falling out was over matters of public interest, is always worth bringing about. To the question (natural in the circumstances) whether the establishment of amity between Mr. George Livesey and Mr. George Bray is likely to facilitate the fusion of the two national technical Associations, the only possible answer is that it removes an obstacle which, whatever its importance, undoubtedly stood in the way of this development. The

expectation of life of either organization, however, is chiefly based upon the consideration of what it has to offer in return for the personal interest and financial support of those who are eligible for membership. There is no longer any pretence that membership of the Institution and the Institute is not open to the same men. The question is: Can the two organizations continue to live by the same means, side by side? If each had its peculiar attraction, and the sources of support were ample for both, both might live. Before the present year is out, the ground will be cleared for a resettlement of the case for the organization of the gas industry with regard to the facts of experience. The "previous question," it must be remembered, is the state of unity. It is not to be supposed that any gas engineer of the kingdom would be found to argue for the existence of two, or more, national technical Societies in preference to one. If there is, we should like to hear from him.

The spectacle exhibited by the gas industry of the United Kingdom, so far as its separate technical organizations are concerned, is best illuminated by the general light of human experience of Societies and their reformation. All Societies, of every character—from Religions down to Rowing Clubs—have their bad periods, when fractions great or small are tempted to break away for the cause of Reform. It is far better when the process of reformation can be carried out within the bosom of the old organism itself. Too often, especially where personal animosities are involved, the forces making for reform do not stop short of open revolt. So sectional interests arise, which act like rust in a cracked piece of metal, to prevent a sound soldering-up of the fissure even after the strain that created it has ceased to operate. The world at large —and let us hope the little world of gas men also—is growing tired of "the dissidence of dissent," which in times past has induced sections of people, of a common origin, to set up new Societies to their own taste whenever they found themselves in disagreement with their old companions. It was never intended, or hoped, that there would always be two representative Gas Engineering Societies; but those who left the Institute thought their new organization would prove to be more useful, and consequently more attractive, than the old. Is it? Are the greater sacrifices still demanded of the pioneers of the new departure defensible? Would there ever have been a disruption, if the Gas Institute had always been like it was during the recent meeting.

The future of the movement in favour of the restoration of unity which received so great an impetus last week, must be left for time to ripen. Sectional interests have been created and fostered, and individual pretensions and prejudices have been encouraged, all of which will take time to compose. Time, in short, is of the essence of the situation; for it will infallibly help the stronger and more vital, and enfeeble the weaker side. With this conviction, the whole matter may be safely allowed to stand over.

Proposed Continental Excursion of the Institution of Gas Engineers.

In another column will be found the sketch programme for the Autumn Meeting of the Institution of Gas Engineers. According to the expectation held out at the last meeting in London, the President (Mr. F. D. Marshall) is endeavouring to arrange for a somewhat important September tour, comprising Berlin, Copenhagen, and Hamburg. In order that certain disagreeable features of the Amsterdam and Brussels trip of 1897 may not be repeated, Mr. Marshall is desirous of organizing this excursion himself. The first step in the proposal was taken in the form of the issue by Mr. Thomas Cole, the Secretary, of a preliminary circular from the office of the Institution, dated the 9th inst. This was a very vague notification; stating that it was proposed to start from London on Friday, Sept. 8, and travel *viâ* Queenboro' and Flushing to Berlin and Copenhagen; "the return journey being "made about 7 or 8 days later," through Hamburg. It will be observed that the President's later suggestion shows a considerable expansion of this scheme, as regards time. We venture to think that Mr. Marshall's hospitable mind has rather stretched the duration of the trip beyond the period which most of those who would gladly go the round could spare for the purpose. Mr. Cole's notification, however, erred on the other side, in the estimation of those best qualified to judge of the exigencies of the journey. More consideration should also have been given at the first to the cost of travel. There is no need to go first class on any of the German trunk railways; and the circular fare ought not to exceed £9 in any case. The invitation to intending travellers to choose their own hotels is wise. Mr. Marshall can be trusted to recommend suitable quarters; and his faithful assistants will see to the comfort of the strangers. Being upon the spot, the President will be the best of all possible guides; but he must husband the time, even more than the expense, if a really good meeting s to be ensured.

The "Powers of Charge" Committee.

The Select Committee of the House of Commons on the Powers of Charge of the London Gas Companies met on Tuesday and Friday last week, and took a mass of further evidence. Mr. George Livesey completed his testimony by the middle of the first day, and was followed by Mr. J. W. Field, the Secretary and General Manager of The Gaslight and Coke Company. A good deal of Mr. Field's evidence-in-chief was devoted to the elucidation of the state of affairs resulting from the terms of amalgamation of the London Company. This witness had not concluded his evidence at the adjournment, and had scarcely touched the specific allegations of previous witnesses against the Horseferry Road administration. It is practically impossible to abstract Mr. Field's statements, which require to be read carefully word by word, in order that their full weight may be properly appreciated. As it was, the members of the Committee do not appear to have been able to follow him clearly through his very technical statistics. The truth of the matter is that as the investigation has gone, The Gaslight and Coke Company have been put upon their defence. Consequently, all the figures they produce are regarded as having been picked for a purpose. Nobody questions Mr. Field's ability as a statistician; and the brilliancy of the arithmetical fireworks with which he is able to surround that fundamental tenpence per thousand cubic feet difference in the prices of gas north and south of the Thames, is little short of amazing. He is ably supported by a staff of alert assistants, who seem to have every figure demanded ready for instant use. The services of these devoted subordinates do not receive any public recognition; but this part of the work of the Horseferry Road is always well done.

The Refusal of Prolongation for the Coze Patent.

The petition for the prolongation of the Coze patent for inclined retorts was heard on Wednesday, and was refused, as will be seen by our special report of the proceedings in another column. This process of law was followed with much interest, for a very obvious reason, by the representatives of a large section of the gas industry of the United Kingdom. Mr. Fletcher Moulton, Q.C., was the leading Counsel for the petitioners, the Automatic Coal-Gas Retort Company, Limited; and it is unnecessary to describe how earnestly, and with what address, the case for the extension of the period of the patent was laid before their Lordships. But the fate of the application was sealed by the fact of the petitioners being a purchasing Company, in which the original patentee had not retained a commanding interest. In these applications for prolongation, the interest of the patentee, not the merit of the invention, is the determining consideration. The Solicitor-General did not press the case for the Crown; but the facts were such as to spare him the trouble. It was unfortunately clear enough that M. Coze had not made much out of his invention; but it was equally clear that, as Lord Macnaghten remarked, whatever he might get by the prolongation of the English patent would be very small indeed. Thus, in the circumstances, the issue was never for a single moment in doubt. If M. Coze had had a larger interest in the petitioning Company, it might, and very probably would, have been otherwise. The moral of this narrative belongs more especially to the order of financial ideas than to that of the patent law. It seems a great pity that a meritorious inventor, as M. Coze has been adjudged to be on all pertinent occasions, should have been constrained by the necessities of the case to become a stranger to the enterprise which had its origin in, and was bound to rely for protection on, his patent right. There must be something rotten in a system which works out as this example has done, with the net result that one of the acknowledged advances of gas manufacturing methods has proved hardly worth the doing, so far as the individual inventor is concerned. Human nature is such that men will always go on

inventing and improving at all hazards; but the story of the Coze patent is not one that can be told with any degree of satisfaction by anybody who desires to keep up the delusion that desert is always rewarded in this world. Of course, we all know in a general way that this is not so; but concrete proofs are none the less disconcerting when they arise in all their hard, prosaic crudity.

A Trade Union Keeps its Word.

THE great strike and lock-out in the Leicester shoe trade, in the year 1895, was followed in these columns at the time for the sake of the light thrown by it upon the principles and methods of Trade Unionism. It will be remembered that the dispute was eventually settled upon terms which included the establishment of a guarantee fund as a means of ensuring fulfilment of the engagements of the parties. Early in the present year, the Employers' Federation was in communication with the Union Executive respecting certain difficulties that had arisen in London. There was a dispute at a London factory in regard to the classification of material; and, according to the terms of settlement, all such disagreements should be submitted to an Arbitration Board. In this case, the remedy failed, because the workmen had never appointed representatives to the proposed Board; and they persisted in this default notwithstanding the efforts of the President of the Union to bring them to reason. There was a strike; and as the whole proceedings of the men was in contravention of the terms of the strike settlement, the Employers' Federation lodged a claim with Lord James of Hereford for payment of damages out of the guarantee fund. Before going on to make an award, Lord James appealed to the men of the London branch to put themselves right by appointing their representatives to the Arbitration Board; and this was done. Thus at the final proceedings Lord James had the parties before him, and was only required to deal with the question of the illegal strike. The claim of the Federation upon the guarantee fund was stated to his Lordship by Alderman S. Lennard, who is the Chairman of the Leicester Corporation Gas Committee. The illegality of the strike was clear, inasmuch as Resolution 8 of the terms of settlement declares that "no strike "or lock-out shall be entered into" until the matter had been considered by the Arbitration Board. The guarantee fund, which was liable to make good the claim for damages, was established by a trust deed in which Lord James was named Umpire, with power to deal with all such claims. The responsibility for the breach of the terms of settlement was shown by Mr. Lennard to rest entirely on the Union men, who struck "in the usual way"—picketing the factory, and all the rest of it, as though the safeguards designed to prevent such outbreaks had no existence. It appears to have been understood in the trade that the London men had never liked the terms of settlement, and paid no heed to the representations from the Union headquarters at Leicester as to the danger of their revolt. The employers fully recognized from the first the gravity of the situation thus created. They stood by their colleagues in distress, and refused to meet strike by lock-out, wishing first to try whether the terms of settlement would bear the strain of the emergency. The Federation claimed £985 damages for the strike, which would not have fully compensated the manufacturer, but would have exhausted the amount paid up as the guarantee of the Union. Lord James has ordered the payment of £300 out of the £1000 deposit, which is a sufficient indication of his Lordship's sense of the gravity of the offence of the London branch of the Union. At the same time, he was requested to adjudicate upon a demand of the Leeds workmen for the consideration by the Leeds Arbitration Board of a piecework statement. The latter is a technical question, of no interest for outsiders; and Lord James has disposed of it for the time being. These matters are worthy of notice, as showing that the National Union of Boot and Shoe Operatives, at any rate, have arrived at the stage of willingness to obey the laws which they helped to make. This is citizenhood indeed; and the Union Executive at headquarters are to be congratulated on their wisdom in upholding the terms of the settlement. When organized Labour keeps its word, it is the equal of its masters.

The new issue of Field's "Analysis of the Accounts of the Principal Gas Undertakings in England, Scotland, and Ireland" for the year 1898 has just been published.

WATER AND SANITARY AFFAIRS.

THERE was no exciting topic at either of the London Water Companies' meetings held last week, and reported in another part of the "JOURNAL." Sir Henry Knight was able on Tuesday to congratulate the proprietors of the Southwark and Vauxhall Company upon the favourable circumstances in which they were assembled, bearing in mind the difficult times through which the Company had passed since the previous gathering. Dealing with the finances, he pointed out that under their Act of last year the Company had to construct additional storage reservoirs at Molesey, which was to a large extent the cause of an over-expenditure of capital to the extent of £70,000. But such works as these are absolutely necessary; and therefore more capital is to be called up. While money is going out, however, it is satisfactory to find that the income is not falling off; the water-rents for the six months covered by the accounts being £7464 more than in the corresponding period of the preceding year, while those for the entire twelve months showed an increase of no less than £13,605. The sum available for distribution—£44,469—is £2875 less than it was this time last year; but the Directors feel justified in maintaining the higher dividend at the rate of 7½ per cent. declared at the previous meeting. Bearing in mind the events of the past summer, and the action of the Government in introducing their Intercommunication Bill, it is due to the Company to give prominence to the fact that they have been pushing on with the very work contemplated in that measure. They have laid a large main from their station at Nunhead, where a new reservoir has been constructed under the powers granted to the Company in 1894; and they will be able thereby to give the East London Company the auxiliary supply of water for which they have already applied.

At the meeting of the Grand Junction Company on the following day, Mr. F. Tendron had the gratification of informing the shareholders that at last an end had come to the large expenditure forced upon the Company by the great frost of 1895. Although the chances of a recurrence of such extraordinary meteorological conditions were very remote, the Directors felt it incumbent upon them to lower all the mains which were affected by the frost. Happily this has been paid for; and now all the surplus income will be available to meet the expenditure entailed by the Staines scheme. However, the carrying out of this work will put the Company in possession of a supply of water sufficient to satisfy the requirements of their district up till 1937, even allowing for a liberal increase in the population. We have never hesitated to acknowledge the value of this undertaking in maintaining and improving the water supply of London; and it was with justifiable feelings of gratification that Mr. Tendron referred to the association of his Company with their two neighbours in a scheme which, as a matter of fact, originated with a member of his own Board. The Company have thereby been placed, as he said, in a "splendid position;" but they have had to pay for it. They have willingly done so in the past, and they are ready to repeat the operation. Although the present additional net earnings of the Company would have justified the payment of a 9 per cent. dividend, only 7½ per cent. has been declared; and the Board do not hold out any hopes of an increase, for the perfectly sound reasons set forth by the Chairman. However, no special expenditure is anticipated, except, perhaps, in connection with parliamentary proceedings; for the London County Council, although just now in a somewhat subdued mood so far as the Water Companies are concerned—their wrath being directed rather against the Government—fully intend to rouse themselves before next November (by which time the report of the Royal Commission will doubtless have been issued), and revive their Bill for the purchase of the water undertakings. If that of the Company is acquired, the shareholders surely have a fair claim, as Mr. Tendron pointed out, for repayment, in the form of dividend earned, for all the money they are paying on account of the Staines works. We alluded last week to the main the Company are laying along Oxford Street to connect their system with that of the New River Company, and in this way render assistance to the East London Company. Mr. Tendron announced that the whole of the work is expected to be completed within a month.

In our "Technical Record" columns to-day, we publish the essential parts of two papers of more than ordinary interest on water questions. The first is the contribution by Mr. M. W. Hervey, Engineer of the West Middlesex Water Company, to the Conference of the Institution of Civil Engineers; and the second is the communication which Dr. Ad. Kemna made to the British Association of Water-Works Engineers. The first author dealt with the question of "The Use of Flood Waters;" the second expatiated on "The Biology of Sand Filtration." There is an unintentional affinity between these two papers, as, reading them together, they bring before us the best of present-day knowledge regarding the evolution from crude waters of a fluid fit in every sense for dietetic purposes. On the one hand, Mr. Hervey shows that the views of engineers are broadening as to the character of the raw waters which may be impounded, and the times and seasons at which this may be done. On the other, Dr. Kemna's paper reveals how the growth of a clearer perception of the physical forces which combine to produce refinement in the processes of purification and filtration has given birth to those larger views set forth by Mr. Hervey. Until recent times, flood water was regarded by the water engineer as something to be shunned, both in the interest of the consumers and for his own peace of mind; but now—and this is the sum and substance of Mr. Hervey's paper—"many experts are of opinion that flood water may be "taken without restriction, provided that it is afterwards "subjected to subsidence and efficient filtration." While this gives pleasant visions of larger available supplies and immunity from the inconveniences occasioned by drought, no one can shut his eyes to the fact that the provision of large subsiding and storage reservoirs required for clarifying and dealing with waters of the character yielded by a flood will greatly add to the cost of "production." But expense must always be a secondary consideration in the question of the supply of this necessity of life; the maintenance of the supply being the paramount factor. The evidence which Mr. Hervey produces as to the purity of the flood water after undergoing the refining processes to which it is subject, should be sufficient to satisfy the most fastidious of water consumers. But would it if they were aware of its use? The water consumer is a most captious individual; and, as a rule, is—analysis and expert opinions notwithstanding—very squeamish as to the source of his supply. River water taken at normal periods is distasteful to him; but the knowledge that his water was being drawn from a river when in almost its worst state would not by any means tend to improve his feelings towards the water authority, who—especially in the case of a company—is regarded by him, and ever will be, as the most unscrupulous and exacting of all creations. We do not advance this in opposition to, or as anything worthy of particular regard in connection with, the use of flood waters for domestic supply. But in these days a great deal of respect has to be paid to public opinion; and this is simply a little difficulty which such use of flood water may sooner or later give rise to, and which may have to be encountered. However, the importance of the matter to the London Water Companies cannot be denied; and it is a pleasure to assist Mr. E. M. Eaton in drawing prominent attention to the joint opinion of himself, Professor Dewar, Sir William Crookes, and Mr. Charles Hawksley, "that there is no necessity to pass "one single day's flood from the subsiding reservoirs of "the London Water Companies."

Societe Technique du Gaz en France.—The annual congress of this Society, which is being held in Paris during this week, under the presidency of M. Vautier, is specially interesting from the fact that one of the papers to come before the members is by an Englishman—Mr. C. E. Brackenbury, Assoc.M.Inst.C.E., of the Continental Union Gas Company, whose name recently appeared in our "Correspondence" columns in a discussion of the metric system. He will deal with the subject of the Arrol-Foulis hydraulic stoking machinery.

A Gas-Engine of 650-Horse Power.—According to the American News in the "Engineer," one of the largest gas-engines in existence, if not the largest, is a Westinghouse engine now in use at East Pittsburgh. The engine is of the vertical inverted type, with three cylinders and two outboard fly-wheels. It is rated at 650-horse power, and closely resembles the Westinghouse steam-engines. In engines of this size and larger, to develop 1-horse power is said to require the consumption of less than 1 lb. of coal in an efficient gas-producing plant. An engine of 1500-horse power is now under construction.

THE INCORPORATED GAS INSTITUTE.

PROCEEDINGS AT THE THIRTY-SIXTH ANNUAL GENERAL MEETING,

HELD AT

THE WESTMINSTER TOWN HALL, JUNE 13, 14, AND 15, 1899.

Mr. SAMUEL STEWART, of Greenock, President.

REVIEW OF PROCEEDINGS.

IT was a good assembly of members of the Incorporated Gas Institute who faced the President, Mr. S. Stewart, of Greenock, and the members of the Council at the hour appointed for the commencement of business on Tuesday. The place chosen for the gathering—the Westminster Town Hall—was excellent for the purpose in every respect with the sole exception of the acoustic properties of the hall, which left a good deal to be desired. Owing to this untoward circumstance, the formal announcement of the names of the premium-takers for last year's papers and the presentation of the very favourable report of the Council passed without notice.

The first note of applause was struck in acknowledgment of Mr. West's brief congratulatory remarks on the sound state of the Institute finances, and its numerical strength. Mr. S. Y. Shoubridge's appearance to receive the First Premium and the President's Medal for his able memoir on "Inclined Retorts" was marked in the same way; the judgment of the members evidently approving of the disposition of the premiums by the Council. The preliminary business was quickly disposed of; and the popular President was soon able to rise for the purpose of reading his address, which unfortunately was very badly heard; the incessant passing of the trains on the neighbouring District Railway extinguishing the small chance of being audible which the other conditions left to Mr. Stewart. With exemplary patience and politeness, the meeting sat quietly through this important part of the programme, which, for the reasons stated, was deprived of the effect due to the President's pains.

The address began with the conventional expression of thanks for the speaker's election to the presidential office. It went on to congratulate the members on the continued progress of the Institute in numbers and financial solvency, and reminded the followers of the gas engineering profession of the advantages gained by association in fellowship. It is unquestionably true of gas manufacture, as of other modern industries, that those practitioners who elect to plod on their solitary way, aloof from their compeers, run a great risk of falling behind in the race. A lesson in this regard may be taken from the most modern of technical pursuits—"record cutting" upon the cycle track. The would-be record maker or breaker can do nothing unless he is "paced" by some agency competent to show him at every instant of time whether he is doing his best or not. So in professional gatherings, men "pace" one another to the advantage of the individual and the community. There is, of course, nothing new in the President's remark that men learn as much from their own and others' failures as from registered successes. He might have gone farther, and said yet more for the "sweet uses" of that kind of adversity which comes to adventurous technicians in the shape of mistakes, disappointment, and wasted time and effort. It is one of the truest of all aphorisms that the man who never makes mistakes never makes anything else. There is a subtle flavour of humour about this saying which would have come well from the President, as a sober-minded Scot, if he had happened to think of it; but in the circumstances we will "read it into" the remarks he actually did make on this head.

It is to be hoped that those gas managers who owe allegiance to the Gas Institute will take to heart the presidential observation that the advancement of their own knowledge and aptitude cannot be procured to the fullest span of their individual capacity by reading the technical journals, and seeing what other men have to say of their doings. This is one means of instruction; and a professional man who does not keep the run of the technical

periodicals of his day may as well go "on the shelf" at once. But learning is not everything, nor even in all matters the main thing. It is the suspicion of this truth that makes so many Englishmen cold to the *furore* for bookish instruction that seems to rage so virulently in Continental countries. Doing is far and away the best means of education; and it has hitherto been the ruling idea of Englishmen that people with a living to get can hardly start too early or too low down. Without going farther into this highly inviting subject, we can at any rate support Mr. Stewart in urging upon gas technicians desirous of attaining the mastery of their avocation the necessity not only of their doing work for themselves, but also of doing it under the eyes, as it were, of their fellows. Thus is knowledge increased and spread abroad.

The President referred in guarded language to "our unhappy divisions," and remarked upon the obvious undesirability of the existence of "two Associations representing our great and growing industry, both having their headquarters in the Metropolis, with only a wall separating their offices." Mr. Stewart did not mean by this that there is any objection to this physical proximity of the two organizations, but only that the duplex arrangement is regretable. Of course it is, as everybody grants in principle; but a little more time must be allowed for the working of the influences which contain the potentiality of the restoration of formal union. The President's reference to this delicate matter was in unexceptionable taste; and he at least has the satisfaction of knowing that, whatever may be the forces that caused or perpetuate disunion, nothing of this can be laid to his charge.

A good deal of the address was made up of matter taken from the Board of Trade Returns of Authorized Gas Undertakings; but the essentially indigestible nature of the statistics of these official publications wreaked itself once more upon the venturesome President, whose attempt to make *pabulum* out of them was not a notable success. From this very laborious exercise, the address passed to a survey of modern carbonizing methods; and it is not the fault of the President that, as he mentioned one division of the subject after another, the impression grew that Scotland is distinctly "out of it" as regards mechanical improvements. In one important respect, however, the circumstances of Scottish gas workers have conspicuously improved. Fifty years ago, the gas stokers at Greenock were paid 2s. 8d. per shift of twelve hours; whereas now they get 5s. per shift of eight hours, doing as much work during the shorter time. The presidential comment upon this change in the conditions of the gas stoker's employment is that, "while consumers are getting the advantage of cheaper gas all over the kingdom, it is not at the expense of the labourer, but it is due to those whose minds have evolved inventions quite revolutionizing the methods of making gas." This is to a great extent the truth; but it is not the whole truth. It is entirely due to mechanical invention that the gas stoker is able to carbonize more coal than his predecessor of the past generation, with less fatigue; but the improvement of the man's condition as a member of the community has been otherwise enormous. Not merely have wages doubled in amount, but the purchasing power of the money has grown probably three or fourfold during the same period. Both facts belong to an order of considerations applying to gas manufacturing and all other employment in this country, which could not be enumerated, much less discussed, in a Presidential Address to a technical society.

The improvement of gas-burners was briefly acknowledged by the President; but here again his remarks tended to encourage the belief that Scotland is slow to move in such matters as the reform of the scale of street lighting. One might have expected a few observations on the obscure question of the actual and prospective effect of the fashion of incandescent lighting upon the cannel gas manufacture of North Britain; but there was not a word about it in the address. How much longer will Scotland be content to pay a heavy price for gas on account of its reputed high illuminating power, when the incandescent burner will do twice as well with gas of half the nominal candle power? That is the question which the President left unformulated, so far as he was concerned, much less answered. As to the respective prospects of gas and electric lighting, the address repeated, without mention of its source, the sententious observation that "electric light can only develop by the increased quantity of its supply; but gas develops by improved methods of consumption." This is one of those remarks of which the bearing lies in the application; and one is left in doubt as to the validity of the latter operation in this case. There is a Nernst, as there is a Welsbach; and these names will not be the last to be inscribed upon the Roll of Fame.

A good portion of the address was occupied with a narrative of the President's personal observations of German gas-works practice, which were not unfruitful. The hint that British students of gas engineering should visit Continental gas-works, is one that could easily be acted upon in these days of cheap and quick travel. A bonus of a few pounds a year to meritorious assistants would be vastly appreciated; and the machinery of the secretarial department of the Institute could be utilized in procuring introductions and permission to pass a few days in foreign works and offices, on the basis of reciprocity. There is something to be learnt, doubtless, from the most hurried of visits to works, in the conventional manner. But for the travelling student, going about alone, a little more than this kind of opportunity is desirable. A visit of three full days to any important gas-works is the shortest time that can be depended upon to allow observation to sink into the memory, and help in the formation of just ideas.

The President's remarks upon the operation of the Workmen's Compensation Act, and the cognate subjects of Old-Age Pensions for deserving workmen, are not misplaced. Mr. Stewart, we are glad to see, takes the same general view of the character of the new law that has been maintained in the "JOURNAL" from the first. He rather magnifies the uncertainty of the operation of the Act, and speaks like a plain man in wishing that all the law of the matter were laid down in one code. That can never be. The same denial applies to his aspirations after the uniformity of the compulsory German law of insurance for workpeople. This is a free country, as Germany is not; and we must take the rough of the situation with the smooth—doing our best the while to soften the one and extend the other, by the exercise of that spirit of humanity which is above all printed law. It would be a pleasing and instructive exercise in industrial economics for some enthusiastic student to take an example of a typical gas stoker, of English, French, and German nationality, and show exactly how his world uses him in his ordinary way of life. It would be a new variation of an old problem, well known in German song, of "Which is the Happiest Land?" In conclusion, it should be acknowledged that the President's address was throughout of a homely, unpretentious, and conciliatory tenor, and as such was the completely natural reflection of the author's individuality. In this respect, therefore, it conformed to the true canon of acceptability for literary productions of its class.

The only part of the address which evoked anything like a demonstration of approval was the passage relating to the desirability of a fusion of the two National Technical Societies. The mover and seconder of the vote of thanks to the President dwelt pointedly and at some length upon the same topic, which was evidently the question of the hour in the estimation of the members.

Mr. Thomas Newbigging's timely contribution to the controversy of differential *versus* uniform prices of gas to private consumers, was the first paper taken. The author read his paper in a clear and pointed style, which went far to conquer the defects of the auditorium. And in this regard, the distribution of prints of the paper was an additional advantage. It is almost superfluous to describe Mr. Newbigging's paper as a statesmanlike production; but the author's position and prestige have never been more worthily utilized than in this powerful piece of pleading for equal treatment to all orders of gas consumers. The paper evoked a lively and prolonged discussion, in the course of which the author's position was in many quarters sharply attacked.

Mr. Glasgow had the place of honour on Wednesday morning for his powerful exposition of actual carburetted water-gas practice. He was perfectly heard, and his closely-reasoned criticism of the Home Office Committee's report was attentively followed.

The conclusion of Mr. Glasgow's lecture was marked by a dramatic incident, which was all the more impressive from the quietness of the performance. This was the entrance together of Mr. George Livesey, Mr. George Bray, and Mr. Chas. Sellers, who thus signalized, to the intense

gratification of the crowded assembly, the termination of an old feud which was of so much more than individual moment. Mr. Livesey spoke eloquently, as usual, in the informal but inspiring address in which he acknowledged the respectful and affectionate greeting that marked his return to the scene once so familiar to him. Mr. Bray followed with a few words, evidently as sincere as they were appropriate to the auspicious occasion. Mr. Sellers capped the happy moment, in his own inimitable style; and when the unpremeditated scene was over, it must have been generally recognized that the most important item in the transactions of the meeting was the one which was not on the programme.

Mr. W. Carr's paper on the "Hydraulic Main" was a really brilliant example of the rich harvest of interest and information that is to be gathered from the patient, intelligent study of a detail of technic. The study of gas manufacture, by an expert practitioner, is bound to be a matter of inquiry into particulars rather than the general features which are of the first importance for learners. Mr. Carr's work on the hydraulic main illustrates the way in which concentration of observation upon a single link in the chain of gas-works technic may be repaid. The discussion of the paper, too, was adequate.

Mr. J. P. Leather's contribution to the solution of the naphthalene problem ranks as one of the most important papers of the meeting. Indeed, it would not be excessive praise to describe this as a technical memorandum of the very highest class. But it is only fair to remark that Mr. Leather's work should not be allowed to obscure the earlier labours of Mr. W. Young, and the Messrs. Glover, who patented a naphthalene cure of the same character as far back as 1896.

The President's reception on Wednesday night was a brilliant success. The Westminster Town Hall had been transformed from the sober not to say sombre aspect of the morning, and presented a bright and inviting appearance. The company was numerous, and disposed to enjoyment; the host was cordiality and hospitality personified; the music was good; and the floor was perfect. It was well on to midnight before the assembly perceptibly thinned.

Notwithstanding the evening's amusement, the following morning saw a strong contingent ready to hear what Mr. C. A. Craven had to advance concerning the working of inclined retorts at Dewsbury. This was a very useful paper, eminently calculated to strengthen the case of this system of carbonizing.

The second paper was Mr. T. O. Paterson's admirable criticism of fuel-gas processes and results. This, again, was a technical memoir of the very best class; marking, perhaps, the beginning of a new era in English gas engineers' opinion and practice.

Mr. F. G. Dexter's clever memorandum on the influence of carbonic acid in illuminating gas, and Mr. Lyne's instructive paper on regenerative retort furnaces for small works, brought to a conclusion a conference of exceptional interest and value.

Mr. F. A. Winstanley's paper was taken as read, through want of time; which might have been saved if the first day's meeting had been prolonged for a couple of hours of the afternoon. This waste of time was the only mistake of the meeting.

Little need be said regarding the formal votes. Mr. Herbert Stevenson was named President for the ensuing year; and London was again chosen for the place of meeting in 1900, with a view to the possibility of signalizing the end of the century, and the commencement of another, by a trip to the Paris Exhibition.

Through the liberality of Mr. Peter Steel, a number of copies of the pamphlet on "Sunday Carbonizing in Gas-Works," noticed in the "Journal" for the 6th inst., were distributed gratuitously during the meeting.

The excursion to Hampton Court Palace and Richmond on Friday was one of the happiest and pleasantest holiday outings ever held in connection with the meetings of the Institute. Favoured with one of the loveliest days of a week of perfect summer weather, the party thoroughly enjoyed the trip, which was carried through without the shadow of anything disagreeable; and the effect of the new order taken by the Council for the disposal of the tickets was a complete justification of their action.

It is impossible to conclude this record of the week's doings of the Institute without according the highest meed of praise to those responsible for the arrangements. From the President, the Council, the Honorary Secretary, the Secretary, down to the humblest officer who carried out their instructions, all worked well and devotedly; and they and the members had their reward in a meeting which, by common consent, was recognized as, without exception, the best all round in the history of the Gas Institute.

REPORT OF PROCEEDINGS.

The Thirty-sixth Annual General Meeting of the Institute was held on Tuesday, Wednesday, and Thursday, of last week, at the Town Hall, Westminster—Mr. Samuel Stewart, of Greenock, in the chair.

Confirmation of Minutes.

The minutes of the previous meeting were taken as read, and confirmed.

Appointment of Scrutineers.

Mr. J. J. Runton, of Hull, and Mr. G. H. Braddock, of Oldham, were appointed Scrutineers of the ballot-papers.

The Report and Accounts.

The Secretary (Mr. Walter T. Dunn) then read the annual report of the Council, which was summarized in the "Journal" last week (p. 1553).

Mr. S. W. Durkin (Southampton) moved the adoption of the report.

Mr. W. Carr (Stalybridge) seconded the motion, and it was carried.

The statement of accounts was taken as read.

Mr. J. West (Manchester) moved the adoption of the accounts, which he considered very satisfactory, especially as he understood there were no amounts outstanding, and still there was a substantial balance in hand on the year's working.

Mr. T. Bower (West Hartlepool) seconded the motion, which was carried unanimously.

Awards of Premiums.

The premiums for papers read at the last meeting were then awarded as follows:—

First Prize (with the President's Medal).—To Mr. S. Y. Shoubridge, of Lower Sydenham, for his paper on "Inclined Retorts at Salford."

Second Prize.—To Mr. H. Green, of Preston, for his paper on "The Construction of, and Mode of Working, Purifiers."

Third Prize.—To Mr. R. G. Shadbolt, of Grantham, for his paper entitled "Village Lighting: A Comparison."

Mr. Shoubridge and Mr. Shadbolt returned thanks; the latter saying he hoped some day to obtain the medal. Mr. Green's prize was handed to Mr. Stelfox, who acknowledged it on behalf of that gentleman, and expressed his regret that he could not be present.

President's Address.

The President then delivered his Inaugural Address, which was given in the "Journal" last week (p. 1545).

Mr. E. H. Stevenson (London), in moving a vote of thanks to the President for his address, said he feared many of the members had not heard it very well, for the acoustic qualities of the hall were not by any means excellent; but he was sure they would all read it with much interest. It touched on a great variety of topics—one very important question being that of an amalgamation of the two Societies, who had been living for some years very much like the various religious bodies. There was a hymn which contained the line—"Like a garden walled around;" and he thought the Institute as well as the other body had lived somewhat on this principle. He trusted the few words which the President had let fall would bear fruit before long, and that they would have one Society representing the whole gas industry. It was a very important industry, and those interested in it ought to all combine against their various competitors. They could not afford to quarrel among themselves, or to have divided counsels; and he sincerely trusted that what the President had said on this point would have some practical result.

Mr. C. A. Craven (Dewsbury), in seconding the motion, said the introductory remarks of the President would well

bear thinking over. He felt very keenly the desirability of an amalgamation of the two Societies, and he had done all he could to promote it. He was very pleased to say he had great hope of seeing Mr. George Livesey, Mr. Morton, and others of their old friends, with them during the meetings; and he had a letter from Mr. George Bray, which he thought would conduce to a restoration of harmony.

The vote of thanks having been carried by acclamation, the PRESIDENT briefly responded.

READING OF PAPERS.

The reading and discussion of papers was then proceeded with. These and the lecture were taken in the following order:—

Tuesday.—(1) "On Differential Rates as between Consumers of Gas for Lighting and for Purposes other than Lighting." By THOMAS NEWBIGGING, of Manchester.

Wednesday.—(2) "Carburetted Water Gas, with Reference to the Recent Report of the Departmental Committee." A Lecture by ARTHUR G. GLASGOW. (3) "On the Evolution of the Hydraulic Main." By WILLIAM CARR, of Stalybridge. (4) "On Naphthalene Deposits: Their Cause and Prevention." By JOHN PETTY LEATHER, of Burnley.

Thursday.—(5) "Recent Experience in Working Inclined Retorts." By CHARLES A. CRAVEN, of Dewsbury. (6) "On Gas for Motor Purposes." By T. ORMISTON PATERSON, of Birkenhead. (7) "The Influence of Carbonic Acid on the Combustion of Coal and Water Gas." By F. G. DEXTER, of Winchester. (8) "The Advantages of Regenerative Firing for Small Gas-Works." By JOHN LYNE, of Wexford. (9) "On the Extension of the Gas Company's Responsibility to Fittings beyond the Meter." By FRANK A. WINSTANLEY, of Rotherham [taken as read].

We give to-day the paper by Mr. Newbigging, with a report of the discussion thereon, and the interesting lecture by Mr. Glasgow; reserving the remainder of the technical business for subsequent issues.

The PRESIDENT proposed a vote of thanks to Mr. Glasgow for his interesting and useful lecture.

[While the President was speaking, Mr. George Livesey, Mr. George Bray, and Mr. Charles Sellers came into the room, and were invited to occupy seats on the platform, amid loud applause.]

Mr. C. STAFFORD ELLERY (Bath), in seconding the vote of thanks, said they were much indebted to Mr. Glasgow for the great pains he had taken in setting forth the case for carburetted water gas from the gas-maker's point of view. He had often thought that the amount of time given to this question by the Committee was uncalled for, because in gas-works, where they ought to know more about it, the number of accidents proved conclusively that there was no more danger in making or using this gas than ordinary gas. He would also remark that the extended employment of slot meters was an additional safeguard against any possible danger from the use of water gas, because if an ignorant person carelessly blew out a light, the meter in a short time automatically stopped the supply, and ensured safety. No doubt some gentlemen present would like to discuss the lecture; and he hoped on some future occasion the subject would be brought forward in such a manner as to allow of this being done. It would, however, be against the rule to do so now; and he would therefore simply second the vote of thanks.

The motion was carried unanimously.

THE INSTITUTE AND THE INSTITUTION.

The PRESIDENT said he had referred in his address to some steps being taken to bring about a union of the two Associations, which remarks he was glad to see were very well received. He was happy to say that Mr. Livesey, Mr. Bray, and Mr. Sellers were now present; and as Mr. Livesey had to leave almost immediately to attend another meeting, he would ask him to say a few words.

Mr. LIVESEY said he was very glad—although he was sorry to interrupt the business—to have an opportunity of saying how pleased he was to find himself once more, in company with Mr. Bray and Mr. Sellers, among his old friends. They had been friends all through; and though they had been separated in a sense, there had never been any interruption of the old friendly feeling which subsisted years ago. He had hoped to be present on the previous day, but had to attend the Gas Inquiry Committee. He was present now (though he had to go to a Board meeting almost immediately) on the invitation of his friend Mr. Craven; and he desired to thank him for his kindness. It was a great satisfaction to both Mr. Bray and himself to be present. The past was gone, and they had to look to the future. He was very pleased indeed to read in the "JOURNAL OF GAS LIGHTING" the reference to a reunion made by the President in his address; for he had often felt it was a great misfortune to the gas industry that they could not present a united front to the world. The British Association of Gas Managers was exceedingly useful in its day; but it was not nearly so necessary then as a united association was at the present moment. All sorts of associations, especially their young rivals the electric light people, had abundant notices in the daily papers of their meetings and conferences; but the gas industry was very much neglected. It had never been appreciated at its true value; for this whole century gas makers had rendered incalculable services to the public, which had never been properly acknowledged. They were generally regarded as the natural enemies of the public, like gas-meters, as the public say—always going against them; and the immense services rendered to the progress of the country were forgotten. Never more than at the present time was it necessary that they should be able to present a united front, not only for defence, but for purposes of progress; for gas was not by any means played out yet. As far as he could see, gas as an illuminant—not merely as a means for heating, cooking, or power—could easily hold its own against all competitors, and distance them in the race. A few days previously he went with Mr. Morton to look at the lighting of the Great Central Railway Station at Marylebone. The gas was turned on while the arc electric lights were going; but one had to go a good deal nearer the electric light to get anything like equality of shadow—showing that 30 cubic feet of gas burned by the Somzée-Greyson system far surpassed the electric arc light in efficiency, while with regard to economy the latter would be simply nowhere. Quoting two or three sentences from the President's address, he said they put the case in a nutshell; and he would specially emphasize the remark that the importance of union, for the purpose of meeting competition and showing what gas was worth, outweighed all other considerations. Personal considerations always had great influence; but sensible men, when they saw that there was a paramount consideration, would sink all personal questions, and work together. He was there without authority from anyone, not having consulted one of his friends, but simply in response to Mr. Craven's invitation; and he was very happy to meet his friend Mr. Bray. He might say that Mr. Bray and he were better friends now than they had ever been; and he hoped their friendship would be a lifelong one. As he had said, he was not present in any representative capacity, and could only speak for himself. No doubt there were difficulties in the way of union; but if men were sincerely desirous of it, he had no fear but that it would be brought about. Each side must be prepared to give up something; but he thought all sensible men on both sides would be prepared to give up a great deal to attain the grand object—a united Institution of gas men.

Mr. GEORGE BRAY said he was not aware, when he came to London the previous day, that he would be expected to appear at the meeting, still less on the platform. It was an honour he did not anticipate or seek; but, being there, it was his duty, as well as his pleasure, to follow the suit led by Mr. Livesey, and say that, so far as there ever was any fundamental difference of opinion between him and the Institute, it was now, at all events, settled. For many years, though Mr. Livesey might not have known it, he had regarded him with growing admiration. From the time when he stood on the Canal Bridge near the South Metropolitan Gas-Works and saw the immense gasholder rising, he thought the man who was capable of producing a work like that, in the face of the opposition he had to contend with, was worth knowing, and was entitled to the respect of everyone. His opinion of him grew from that time; and it had ripened into what he hoped would be a pleasurable friendship for the remainder of their lives. The question which brought him there that day, however, was not one of personal friendship between Mr. Livesey and himself, but the vital interests of the Institute; and all he

wanted to say was that any barrier, real or supposed, which might have been placed between the union of that body and another would be removed by him when the time came for it to be necessary, and he should have great pleasure in doing whatever was desired in the best interests of the Institute. He was not quite of such an overbearing spirit as some might have thought. He never had had anything to gain by what he was doing, and he did not ask for anything; but whatever they might now ask him to do, he would do.

Mr. CHARLES SELLERS said those who were in the habit of speaking second or third in order on a well-known text would appreciate the difficulty he experienced in adding anything new to what had already been said. The business which had brought them there that morning was one which he did not anticipate would result as it had done; and therefore he was quite unprepared to deal with the question, and could only join in the general congratulations that peace and friendship had been declared. He had no doubt, from his knowledge of the two gentlemen who had had this trouble on hand so long, that the treaty would be signed, sealed, and adhered to by each of them. It was true that he was somewhat mixed up with the trouble, but in a very slight way. He was not the general—only a sort of lieutenant or corporal. But he acted in the capacity in which he did act, as Mr. Livesey himself was generous enough to admit, conscientiously; and he had also had a little to do with bringing Mr. Livesey and Mr. Bray together, and in effecting an amicable settlement of the differences which existed between them. He felt that he should succeed, because he always associated generosity with bravery; and the two men who had just spoken were both brave and conscientious. Wherever one saw a man brave, one knew he was generous; and if an attempt were made it would be found that generosity would respond to an earnest appeal. That generosity in each case responded, as they had already heard. It was of no use travelling over the battle-field to pick up the wounded—it was pleasanter to look to the future; and he would only add that he joined most heartily in saying that the hatchet was buried both sides, and that there would be no resurrection of it under any circumstances. He also joined heartily in wishing prosperity to what he hoped would soon be the amalgamated Society.

Mr. T. DUXBURY (Manchester) said, as he was officially connected with the Institute at the time the trouble took place, he was heartily pleased to hear what had been said. There were only two of those who were Members of Council at the time present that morning—two having died, and the others being absent—but on their behalf he might say how pleased they, who had kept the Institute together, were to hear what had been said, and how they would welcome a reunion if it could be brought about.

Mr. W. W. HUTCHINSON (Barnsley), as the other member of the former Council referred to by Mr. Duxbury, wished to endorse his remarks, and to say how pleased he was to see the straightforward, generous way in which the hatchet had been buried. He thought the way was now clear for complete reunion, so that they might face the world in one undivided array.

The PRESIDENT having thanked Messrs. Livesey, Bray, and Sellers for their attendance, and for the remarks they had made,

Mr. LIVESEY said that in his former speech he had not done justice to Mr. Sellers, who had been the mutual friend of himself and Mr. Bray, and who discovered that each of them had a friendly feeling towards the other. They were therefore indebted to Mr. Sellers for this happy reunion. He had also to thank the meeting very heartily for the kind reception accorded him.

THE BENEVOLENT FUND.

The Annual Meeting of the Donors and Subscribers to the Benevolent Fund was held at the conclusion of the business on Tuesday morning.

The minutes of the last meeting having been taken as read,

The SECRETARY read the report of the Committee of Management, which was at once adopted, on the motion of Mr. STELFOX, seconded by Mr. ELLERY.

The PRESIDENT having invited remarks or suggestions from the members,

Mr. J. LEES (Tonbridge) said, now that the desired amount of £2000 had been raised and invested, it occurred to him that if the Committee were rather more liberal in their grants, and spent the whole of the income from investments and also the subscriptions coming in year by year, it would have a tendency to increase the subscriptions, and lead to more members joining.

The PRESIDENT said the Committee were always desirous of giving all the assistance they could to deserving cases.

Mr. ELLERY said if Mr. Lees had any particular case in his mind, and would bring it before the Committee, it would be considered; but it must be remembered that this was a Benevolent Fund, not a Pension Fund. They did not want the idea to get about that if a member of the Institute subscribed to the Benevolent Fund his family would be provided for.

Mr. LEES said he quite agreed with Mr. Ellery. He was not in any way questioning the good intentions or acts of the Committee, nor had he a particular case in his mind, because the Committee very wisely withheld the names of those who were relieved. His only desire was to see the fund increase; and he thought perhaps greater liberality in grants would elicit more subscriptions.

This was all the business.

REPORT OF THE SCRUTINEERS.

On Thursday afternoon, the result of the ballot for the election of office-bearers for the ensuing year was declared, as follows:—

President.—Edmund H. Stevenson, of London.

Vice-Presidents.—T. O. Paterson, of Birkenhead; and S. W. Durkin, of Southampton.

New Members of Council.—R. G. Shadbolt, of Grantham; T. H. Martin, of New Barnet; J. H. Penney, of South Shields; and W. A. Padfield, of Exeter.

Auditors.—Alfred Lass, of London; and W. D. Child, of Romford.

Hon. Secretary.—A. Dougall, Tunbridge Wells.

Benevolent Fund Committee.—B. Green, of Mitcham; and T. T. Marks, of Llandudno.

NEW MEMBERS.

It was announced that all the gentlemen whose names appear in the following list of applications for admission to the Institute had been approved, and would be duly enrolled; and the transference of associate members to the class of members was sanctioned by a vote of the meeting.

MEMBERS.

Alderson, T. H., Selby.
Allwood, W. S., Dunstable.
Ballantyne, J., Rothesay.
Barber, H., Sheerness.
Bark, B., Godalming.
Barrett, F., Ramsbottom.
Battersby, J. T., Ambleside.
Brocklehurst, C., Ambergate.
Buckley, A. E., Corbridge-on-Tyne.
Crossland, S., Abingdon.
Davey, W. R., Newbury.
Davies, T., Llandudno.
Drew, E. W., London.
Dunn, W., Thorne.
Edwards, R. W., Aldershot.
Key, F., Birstall.
Lighbody, T., Renfrew.
Lloyd, D. H., Newton-in-Makerfield.
Mackie, W., Port-Glasgow.
Meiklejohn, J., Aldershot.
Owen, W. G., Aberavon.
Pennington, J. C., Colwyn Bay.
Potts, C., Hyde.
Russell, H., Holmfirth.
Surtees, R., Lymm.
Titley, W., Guildford.
Veevers, C. F., Northfleet.
Wood, S., London.
Woodward, J. H., Skipton.
Young, J. A., Louth.

ASSOCIATE MEMBERS.

Ball, A. F., London.
Buckley, H., Portsea.
Cockburn, E. F., Ramsgate.
Duff, J. R., Morecambe.
Heald, W. L., Nottingham.
Quicke, W. G., Cardiff.
Tooms, J. G., Carrick-on-Suir.
Vince, W. H., Ramsgate.

TRANSFERENCES.

Langford, W., Longton; and Nye, W. T., Rockhampton.

AN HONORARY MEMBER.

The PRESIDENT formally nominated the President of the Société Technique du Gaz en France for the current year as an Honorary Member of the Institute; and he was unanimously elected.

PLACE OF NEXT MEETING.

Mr. ELLERY proposed that the meeting next year be held in London. He said he should like to add, as a suggestion of his own, that arrangements should be made for a visit to Paris, and also that the Council should take

some good hotel, so that the members could all stay together. He would confine his formal motion, however, to the holding of the next meeting in London.

Mr. C. E. Jones (Leyton), in seconding the motion, expressed his satisfaction that, after sundry peregrinations, the Institute had again met in classic and historic Westminster, the home of theoretic and applied science, and the centre of civilization. Everything gravitated to London; and he considered it the proper place for any scientific body to meet.

The motion was unanimously agreed to.

Votes of Thanks.

The President proposed a vote of thanks to the First Commissioner of Works for the permission granted to visit Hampton Court Palace; to the Thames Conservancy, for permission to view the Richmond Lock and Weir; and to Mr. C. J. More, their Engineer, for his kindness in making the necessary arrangements.

The motion was seconded by Mr. E. H. Stevenson, and carried unanimously.

Mr. R. Porter (Elland) moved a vote of thanks to the readers of papers, which he thought would compare favourably with those of recent years.

Mr. A. Macpherson (Kirkcaldy), in seconding the motion, said it was particularly gratifying to gentlemen north of the Tweed to find such good papers brought forward on the occasion when a gentleman whom all Scottish gas engineers and managers honoured and respected so highly occupied the presidential chair.

The motion was carried unanimously.

Mr. R. Watson (Hertford) moved a vote of thanks to the Scrutineers for their self-denying work.

Mr. J. Booth (Southport) seconded the motion; and it was unanimously agreed to.

Mr. S. Y. Shoubridge (Sydenham) moved a hearty vote of thanks to the Council for the able manner they had conducted the business of the Institute during the past year. He especially mentioned the action they had taken with regard to a matter which had caused a good deal of unpleasantness in the past—the presence of the trade element at the meetings; and he thought all would agree that the result had been most satisfactory.

Mr. J. P. Leather (Burnley) seconded the motion; and it was carried.

Mr. H. Tobey (Malton) moved a vote of thanks to the President. He said he had had the pleasure of being for a time on the Council of the Institute with Mr. Stewart, and knew the assiduity with which he carried on the work; and they had all noticed the dignity and ability with which he had filled the chair on this occasion.

Mr. J. M'Gilchrist (Dumbarton) seconded the motion with much pleasure. He suggested that if next year the Council had any difficulty about the Birmingham Medal, and if Mr. Stewart accomplished what was suggested on the previous day, they could not do better than send it to Greenock.

The vote of thanks having been carried by acclamation,

The President, in response, said it had given him a great deal of pleasure to preside over the meeting; and though he was afraid his defective hearing would interfere with the proper discharge of his duties, he had received so much kind assistance from Mr. Dougall and Mr. Dunn that he had managed to get through, and he was pleased to find to the satisfaction of the members.

Mr. D. T. Livesey (East Grinstead) next moved a vote of thanks to the Auditors.

The motion was seconded by Mr. Dunn (who expressed the hope that Mr. Lass would soon be restored to health) and carried unanimously.

Mr. W. R. Chester (Nottingham) proposed a vote of thanks to the Honorary Secretary, Mr. Dougall. He said he did so with very great pleasure, because he had in past years been able to appreciate very highly the services which the Honorary Secretary had rendered. About four years ago, when Mr. Hepworth retired, it seemed almost impossible at first to find a gentleman who could succeed him worthily. But, on looking round, the Council came to the conclusion that on no one could they place the mantle of Mr. Hepworth so appropriately as on the present Honorary Secretary; and no one who had had an opportunity of noticing the zealous and at the same time urbane way in which he carried out his duties could doubt that the choice then made was a wise one.

Mr. T. O. Paterson (Birkenhead) cordially seconded the motion.

The President expressed his hearty endorsement of the proposition; and it was at once agreed to.

Mr. A. Dougall, in reply, said he had done his best; and as the members appeared to be satisfied, he should be glad to serve another year, when, in accordance with the rules, he must make way for someone else.

Mr. Durkin proposed a vote of thanks to the Secretary (Mr. Dunn) for the excellent manner in which he had conducted the business of the Institute.

Mr. Porter seconded the motion, which, having been duly carried, was suitably acknowledged by Mr. Dunn.

The proceedings then terminated.

THE LECTURE.

CARBURETTED WATER GAS WITH REFERENCE TO THE RECENT REPORT OF THE DEPARTMENTAL COMMITTEE.

By A. G. Glasgow, M.Inst.C.E.

Considering that the rôle of lecturer is absolutely novel to me, and that I have no personal qualification for the part, it is not unnatural that, at the moment of addressing you, I should feel a despondent sense of my responsibilities. I can draw no comfort from the list of distinguished gentlemen who have improved this occasion in previous years. In this eleventh hour I realize all too well that they have advanced your expectation of this function to a plane beyond my reach. But pressing in upon, and to some extent obscuring, my natural apprehension is a mood not perhaps usual in a speaker. I refer to a strong impersonal sense of sympathy and commiseration for my audience. I grant you that pity for his audience, on the part of a lecturer, argues poorly for the matter he expects to provide; but I am not to be baulked of my charity. On the contrary, I would seek to trade upon it by suggesting, as an instance of individual reciprocity, that you convert into indulgence for your lecturer a fraction of the sympathy I extend to you as my audience. Failing that, I would bluntly remind you that I am not here of my own initiative. Your grievance is with your Council; and I leave them to meet, as best they can, the righteous indignation you may feel upon the conclusion of my remarks.

Your Council have indicated to me the subject of this discourse; and I will now suggest the manner in which I shall endeavour to treat it. There is doubtless the apprehension in the minds of some present that I may twist this privileged position into an opportunity for advocating the manufacture of carburetted water gas and for exhibiting my own wares. Let me assure such gentlemen that, not only do I appreciate that the privilege you have conferred upon me forbids the introduction of such controversial matter, but that self-partisanship, always distasteful to me, becomes daily more burdensome. Again, there may be those present who see no advantage in carburetted water-gas manufacture, who even extend this view beyond their own circumstances, and believe that those engineers who hold opposite opinions are mistaken in their experience and in their conclusions.

In my remarks I think they will find nothing to imply that I do not respect and, for the nonce, even accept these views. But, gentlemen, there is surely no one here, whatever be his attitude with reference to carburetted water gas, who is not interested in ensuring, to the best of his ability, that any legislation directed against the gas industry shall be necessary for the protection of life, health, or property, and based upon incontrovertible fact. It is with this belief in my mind that I shall venture to lay before you all, whether or not you are in sympathy with the special objects that have brought me and bound me to the mother country, the reasons why, in my opinion, the report of the Departmental Committee appointed to inquire into the manufacture and use of water gas, blocks the way for parliamentary intervention. In the first place, the report proper is distinctly re-assuring. Had this document, as it stands, been popularly available several years ago, I think I am safe in saying that this ancient agitation could never have been revived.

There can be no one in existence to-day, familiar with the utilization of gas, who is not prepared for serious and

even for fatal issue with *coal* gas in the circumstances summarized by the Committee. I quote from the report:—

It appears, then, that the prospect of any serious result from the distribution of gas containing a high proportion of carbonic oxide is practically confined to cases of large escapes into rooms where persons are asleep.

Surely every consumer of gas knows that in such case his life is in jeopardy; yet he extinguishes his jet, turns off his gas-stove, and sleeps tranquilly without giving the subject a thought. Why is this? Simply because he intuitively strikes at the root of the matter, and realizes that world-wide experience, that ultimate and infallible High Court of Appeal, has proclaimed this risk to be so infinitesimal, so far beneath the infinite and unremitting risks of living, as to be wholly negligible. Again—but I will read from that portion of the report entitled:—

Danger of Manufacture and Use.

Coal gas contains a percentage of carbonic oxide, which evidence given before us shows to vary from 4 to 12, according to the kind of coal used and the particular conditions of manufacture.

Carburetted water gas contains about 30 per cent. of carbonic oxide.

Carbonic oxide ranks among the most dangerous of poisonous gases known.

In these facts lies the *primâ facie* reason for apprehending danger from the extensive use of carburetted water gas.

As regards manufacture, the danger to the persons employed appears to be, with proper machinery and arrangements, not greater than that incurred in coal gas-making; and any danger that there may be can, we think, be dealt with adequately under the Factory and Workshops Acts, for the purposes of which gas-works are non-textile factories.

As regards use, the circumstances under which carburetted water gas may be seriously dangerous are comparatively few.

Danger arises only when the gas escapes unconsumed; for when burned in the ordinary way the products of combustion of carburetted water gas are no more unhealthy than those of coal gas.

The danger to be feared is not from explosion; for there is no greater likelihood of that with water gas than with coal gas, but from poisoning.

In the daytime, however, the amount of carbonic oxide is not of serious consequence. An escape of carburetted water gas is as easily detected as one of coal gas; and, except in very special circumstances, can be avoided or remedied long before the atmosphere is in the least degree poisonous.

Even at night very slight escapes of an ordinary character, caused, for instance, by imperfections in the joints of fittings, do no appear to us to be rendered more formidable by the introduction of carburetted water gas. It is practically impossible for a really poisonous atmosphere to be produced by such escapes; and though it is evident that constant exposure to small leakages of gas may be to some degree prejudicial to health, we do not think that the existence of anything like chronic poisoning by carbonic oxide has been established.

It appears, then, that the prospect of any serious result from the distribution of gas containing a high proportion of carbonic oxide is practically confined to cases of large escapes into rooms where persons are asleep.

Although the above ignores the *advantages* of carburetted water gas as regards volume of manufacturing risks, oxygen absorbed, and character of products per unit of light, nevertheless, contrast these temperate conclusions with the letters by Dr. Thomas Cayzer, of Garston, reprinted in pamphlet form from "The Public Health Engineer." While Dr. Cayzer was tracing the ills of his patients to chronic carbonic oxide poisoning, his crusade was fostered in sensational terms by the daily papers.

I record my belief that, had the Garston public been in possession of this official report, their nervous apprehensions could never have been excited and worked upon by such statements; and this issue would be mouldering beneath one of the adjacent tombstones of defunct opposition that pave the path of progress. A vote in the Birkenhead Council has just shown the objectors to water gas in a minority of one; and, as I speak, the artificial vitality imparted to this question is fast wasting away upon the sacrificial altar of experience. Although I am convinced that Dr. Cayzer has been guided purely by public spirit in the matter, still, like all "crusaders," he throws the heavy weight of his enthusiasm into the scales. His imagination proves too much, and clouds his judgment as to the facts of the case. As I am responsible for the "stock" statements he refers to, I quote the following example:—

"A stock statement is that some 20* years or so since, a petition was signed by 223 Boston physicians, in their joint capacity as gas consumers and physiological experts," concluding with the statement: "It —*i.e.*, carburetted water gas—is no more dangerous to health and life than coal gas; and there is no just ground, as far as health and life are concerned, to prohibit its manufacture."

The following would astonish them, if any are alive to benefit by it to-day.

He refers to the report of the Massachusetts Gas Commissioners. I wish here to say that Professor Chandler, Dean of the School of Mines, Columbia University, New York City, the distinguished author of the phrase just quoted, is still very much alive, and after reading Dr. Cayzer's pamphlet writes thus: There is no reason to doubt the willingness of the survivors of the 223 to endorse it:—

Columbia University,
New York, May 24, 1898.

Alexander C. Humphreys, Esq.,
31, Nassau Street, City.

My dear Sir,—In reply to your inquiry, I cheerfully give you my opinion upon the water gas question.

As you are aware, before I became the President of the Health Department of New York, in 1873, I was employed as Consulting Chemist to the New York Gaslight Company, and was familiar with coal gas as made from bituminous coal. When water gas was first manufactured in this city, some prejudice was created against it by the old companies engaged in making coal gas. As the head of the Health Department of this city, I carefully investigated the subject, and came to the conclusion that there was no reasonable ground for opposing the introduction of water gas; and my colleagues in the Health Department were of the same opinion. From that day to this the Health Authorities of New York have never objected in any way to the substitution of water gas for coal gas.

From time to time during the early history of water gas in New York, representations were made by interested parties to the Board of Aldermen, the State Legislature, &c., urging the passage of laws to prevent the use of this gas; but after investigation the public authorities always came to the conclusion that there was no logical ground for legislative interference.

I have kept myself thoroughly informed with regard to everything that has appeared on this subject; and I have never had the slightest reason to change the opinion which I expressed when water gas was first introduced.

I have seen various statistics that have been published to show that the number of deaths from suffocation by water gas greatly exceeds the number of deaths formerly produced by bituminous coal gas. I do not attach any importance to these statistics; and I am satisfied that they do not prove the allegations.

My experience of eleven years as the head of the Health Department of this city, and three years as Chairman of the Sanitary Committee of the State Board of Health, has made me thoroughly familiar with the nature of vital statistics; and, while in the main our vital statistics are very carefully and accurately secured and recorded, there was not, for a long time, any well-directed effort to secure accurate returns of the deaths due to the inhalation of illuminating gas. All deaths from suffocation were practically recorded under one head; no care being taken to discriminate between deaths from illuminating gas, stove gas, benzine vapours, cesspool gases, accidents from carbonic acid gas in breweries, and other cases of accidental suffocation. Hence the few deaths specifically recorded as due to illuminating gas did not by any means represent the entire number.

The heated controversies between rival companies with regard to the introduction of water gas as a substitute for coal gas in our various cities, in which the alleged greater danger of water gas has been constantly used as an argument, have, of late years, led the authorities to differentiate the deaths from suffocation so as to show how many of them are due to the inhalation of gas.

It is for this reason that in some cases the statistics show a greater increase in the deaths from water gas over those in earlier years from coal gas than is warranted by the facts. We may well expect some increase in the number of deaths from illuminating gas; for the reason that the cheapness of water gas and the enterprise of the canvassers of the rival companies, have largely extended the use of gas among the less careful and less intelligent classes, and also because the publicity given to the discussions has taught the public how to use the gas with suicidal intent.

In conclusion, I would say that, as a chemist and as a sanitarian, I consider the introduction of water gas as marking an epoch in artificial illumination; and I do not consider its larger percentage of carbonic oxide as of any serious importance.

Very respectfully yours,
(Signed) C. F. Chandler, Ph.D.

Dr. Cayzer's effort is to show that I am disingenuous in quoting opinions given during the incipient days of carburetted water gas; alleging that subsequent knowledge has led to their reversal. I accept his argument; but must correct his conclusion. You have heard the facts with reference to the case he particularly dwells upon. I will now turn his contention to my own profit. There is one other man in America whose counter-opinion might render nugatory such high authority as Professor Chandler. Any American will know that I refer to Professor Morton, President of the Stevens Institute of Technology.

The original American case against carburetted water gas relied largely upon the evidence of Professor Morton and the vital statistics by which he supported his conclusions. But at a later period Professor Morton asserts:—

I am quite ready to admit that when the subject first came to my notice, my impression was that water gas was so practically dangerous that it should not be admitted into general use; but further consideration modified this view to the belief that it would be a question of economy and efficiency only, whether water gas did or did not become the gas of the future.

And as late as May 3, 1898, with Dr. Cayzer's pamphlet before him, he writes:—

Hoboken, N.J., May 3, 1898.

Messrs. Humphreys and Glasgow.

Gentlemen,—About 1880-85, when the manufacture of what is known as "illuminating water gas" was beginning to be introduced on a

* 15 years.

commercial scale, I was called upon to investigate its composition and to report upon the same; and also to express an opinion on its probable toxical effects in relation to its large percentage of carbonic oxide as compared with the ordinary illuminating gas made by distilling bituminous coal.

In considering this last question, I naturally had recourse to the literature of chemistry, and from this obtained a practically unanimous opinion that carbonic oxide was a very poisonous gas, and might be regarded as the main toxical constituent of ordinary coal gas.

Shortly after 1885, the gas-works in the City of Hoboken, where I reside, changed their manufacture from coal to water gas; and I was faced with the problem as to what I should do about it, as my house, as well as the Stevens Institute of Technology, with all its workshops, laboratories, and lecture rooms, was supplied from these gas-works.

I proceeded at once to make careful inquiries—as I was in a position to do with advantage, having intimate relations with the most important coal-gas companies—as to what had been the practical experience in other places where water gas or wood gas (which contains about the same proportion of carbonic oxide) had been already in use for some years.

The result of these inquiries was to satisfy me that there was no practical difference in the danger attending the use of one kind of gas rather than the other. Coal gas, beyond question, caused death when inhaled to the extent it would be when a burner was blown out or turned on without being lit in a closed bedroom; and though it was reasonable to believe that death would ensue more rapidly if water gas instead of coal gas was present, this was only a difference in degree which would not modify the general result.

I therefore concluded to accept the water gas supply without remonstrance, and have never seen the least cause to doubt the reasonableness of that conclusion. During the ten years and more which have since passed, not a single case of injury from the water gas in Hoboken has come to my attention; nor have I heard of a single instance elsewhere in which circumstances indicated that the result would have been different if coal gas had been present instead of water gas.

I feel, therefore, that I owe it to a sense of truth and justice to say that my earlier conclusions, founded solely on theoretical grounds, were in error as far as they asserted or implied that, as a matter of practice, water gas was, or would be, more dangerous to life than coal gas.

It is as true as it ever was that carbonic oxide is a very poisonous gas, and that water gas contains many times as much of it as does coal gas; but I am satisfied, from personal experience and observation, that, under the existing conditions of use, there is no appreciable difference in the danger resulting from such use.

Yours very truly,
(Signed) Henry Morton, Ph.D., &c.,
President Stevens Institute of Technology.

There is yet to be produced any original evidence in favour of carburetted water gas that has been modified by the fullest subsequent experience; but I have put before you the striking instance of a reversal of unfavourable opinion on the part of the highest authority in such matters on the American Continent. Mr. Humphreys has further submitted, in Appendix VI., C, recent letters from the principal technical experts who testified against water gas in the Boston Hearings, or otherwise actively opposed its introduction, showing, with one exception, a revolution of opinion; and, in the case of that exception, a modification leading to the installation of large water-gas plant. Also a letter from Mr. C. W. Hinman, late Gas Inspector for Massachusetts, revising the opinions in his famous 1885 report, upon which much of the subsequent opposition to carburetted water gas has been based. It is equally easy to satisfy Dr. Cayzer with regard to the present opinion of Dr. Frankland (now Sir Edward Frankland, K.C.B., F.R.S.), which he discusses at some length. I can supplement my publication of Dr. Frankland's earlier opinion by reference to the report. Sir Edward Frankland's evidence is summarized in Question 1187:—"You advocate using pure carburetted water gas?—Yes; if the odour were sufficiently strong to give warning of any escape."

I shall presently read you what the Massachusetts Commissioners themselves have to say upon the question; but while I am quoting letters, I will add one from Dr. Walther Hempel, for the reason that Dr. Haldane, in the course of Sir Henry Roscoe's evidence, states, his (Hempel's) opinion would be most important.

[*Translation.*]

R. J. Monks, Esq., Boston. Dresden, Dec. 31, 1885.

My dear Sir,—You have asked for the opinion of water gas I formed during my stay in America the past summer. The water-gas process is, without any doubt, one of the greatest inventions connected with the gas industry since gas was first made use of.

If one compares the dangerous qualities of coal gas and water gas, it should not be considered that the one gas is not at all, and the other very, dangerous; but that both are very dangerous fluids, which should be handled with the greatest care.

It seems to me that the case is the same as the choice between a dull and a sharp razor. Everybody will be pleased to get the keenest edge, realizing that the danger increases with the sharpness.

Phosphorus matches come under the head of poisons, while steel and flint are entirely harmless. The great speed of an express train involves much more risk than the motion of the old-time coach. In spite of these facts, we all keep matches in almost every room in our houses; and we complain if the railway train does not move at a high rate of speed.

Taking these facts into consideration, it seems to me a retrograde step if the use of water gas is forbidden by law. It seems to me that we are only acting in the spirit of our century, when we put aside the question of increase of danger in introducing water gas; since we know that, by the exercise of common care and prudence, we are able to avoid all accidents from its use.

Yours most sincerely,
(Signed) Dr. Walther Hempel,
Polytechnicum of Dresden, Germany.

I find no evidence from Dr. Cayzer included in the Committee's report; but Dr. John Albert Fisher, of Garston, who refers to Dr. Cayzer as his friend and colleague, apparently represented his views. Any criticism of Dr. Fisher's evidence must pass the bounds of courtesy. I shall, therefore, recommend it to your perusal as an amazing instance of local official opposition to carburetted water gas, and content myself with calling your attention to the character of the "Statement of Injuries and Deaths" included in this evidence, and presumably revised by Dr. Cayzer.

Statement *of Injuries and Deaths caused by Carburetted Water Gas in the Garston District.*

Date.	Person.	Circumstances.	Result.
December, 1895	Female servant	Found in her room	Unconscious for 72 hours. Recovered.
January, 1896	Rowe, working man	Drilling hole in gas-main	Unconscious for 15 minutes. Recovered.
" "	Working man	Connecting supply pipe for Liverpool Gas Co.	Unconscious for two hours. Recovered.
February "	Police constable	Found in his room	Unconscious. Recovered.
April "	American visitor	" "	Unconscious for two days. Recovered.
September "	Mrs. Lewis, of Anglesey	Found in her bedroom	Unconscious for three days. Revived. Died four days later. No medical evidence called at inquest.
December "	Yarwood, working man	Found by the side of his bed	Dead.
January, 1897	Captain James	Found in his room	Unconscious for six hours. Recovered.
	Miss R. Cowan	Became faint from smell of gas in church	Recovered, though suffered for some time afterwards.
	Mr. S. Laken	Complained of palpitations and lack of breath and energy	Gas fittings found to be bad.
	Mr. Row	Came home 6.30 p.m. Detected smell and experienced choking sensation	Concluded that house was full of gas. Prevented household from being suffocated.
	Mr. T. Row	His cook became sleepy and nervous; made mistakes, forgot things	Gas cooking-stove locked up, and cook recovered.
	Mrs. Gray	Tap of gas-stove in back kitchen not turned quite off	Entered kitchen. Took few inspirations. Staggered out. Recovered.
	Mrs. H.	Gas escaped through firing-back of a gas-stove	Became dazy after few minutes exposure. Recovered in fresh air.
	Dr. Cayzer	Tap left on in porch	Became faint and weak. Recovered; but felt uncomfortable all next day.

Of the fifteen instances in this remarkable statement, seven are alleged to have occurred during the 27 days of January, 1897, ending the period when pure carburetted water gas was distributed. All of these so-called victims are said to have retained consciousness; and the circumstances cited oblige one to conclude that a more intelligent diagnosis would have found them victims only of diseased or excited imaginations. Two further instances were ordinary cases of "gassing" of two men in the Company's street service. Of the remaining six instances, two were fatal, under circumstances which I can summarize from the newspaper reports: The first instance occurred eighteen months after the exclusive supply of carburetted water gas was begun. The gas burning in the bedroom of an aged woman was extinguished by being turned off for a few moments at the meter. The door being locked, the room was not entered until the following mid-day. The woman lived for nearly a week, when she succumbed to the strain on her enfeebled constitution. The Coroner severely censured the householders for gross negligence.

In the second case, a workman having retired for the night, rose and complained to the householder that he was unable to sleep on account of the smell of gas in his room, in which there was no gas fitted for use. The man subsequently returned to bed with his wife. The woman on getting up some two hours later than her husband's rising time, discovered him, fully dressed, lying dead on the floor. She experienced no inconvenience, and the autopsy showed that the man had fatty degeneration of the heart.

There is certainly nothing extraordinary in these fatalities, following eighteen months complete immunity; but those proclaiming them shut their eyes to similar results from coal gas. For example, contemporary with the Garston instance of external leakage, where one of two persons sleeping together was not even affected (the deceased having heart disease), both persons at Cork and Drogheda were found dead by external leakage of coal gas.

Although the above cases are not included in the statements given by Dr. Parsons in his appendix (pp. 94-97), these statements—confessedly incomplete—show sufficiently well the result of ignorance or carelessness in the use of coal gas. Alongside the two Garston (West Derby) instances will be found two separate fatalities at the comparatively small town of Ashton (coal gas exclusively) due apparently to simple escapes from ordinary bedroom brackets. But it is fruitless to continue opposing citation of individual cases. If anyone expects immunity from coal gas under the circumstances prevailing at Garston, I invite him to confine his optimism to argument; for he will not survive a personal test of the question. I will end this portion of my discussion by quoting from Dr. Parsons' appendix, page 98, the particulars of the third and final fatality at Liverpool:—

> Four Swedish emigrants in boarding-house. All (*sic*) went to bed about 9.30 p.m. in room with cubic capacity of 962 feet. Two ventilators, larger closed; no fireplace; gas-burner passing about 7½ cubic feet per hour. Deceased sat up writing a letter. Supposed to have blown out the light. Found dead about 7.45 a.m. The three others unconscious.

You will note that four grown men were in a room of less than 1000 cubic feet capacity, and with practically no ventilation, for over ten hours, during the whole of which time the burner is estimated to have passed 7½ feet hourly. According to the evidence of the Liverpool Medical Officer of Health, 350 cubic feet are required for each lodger in the bedrooms of a registered house. It was then illegal for more than two persons to occupy this room. These regulations were framed with reference to ordinary sanitary limits, without consideration of the character of any gas; but at the inquest there was no suggestion of overcrowding. The result was attributed entirely to the character of the gas. One might have imagined unpleasant results even had the gas remained lighted; but for the last eight hours, at least, it was escaping unconsumed. Yet three of the four men recovered promptly and gave evidence at the inquest.

I would willingly claim this instance for carburetted water gas; but I am obliged to admit that the gas escaping into the room was practically pure coal gas. The room was in a registered emigration house of the Cunard Company, in Great George Square; and it is practically certain that after midnight no carburetted water gas was in the pipes of that district. Yet, instead of accepting this happy illustration of the comparative safety of coal gas, the Corporation officials, at the inquest and in evidence before the Committee, gave prominence to this result as an example of the danger brought about by the use of carburetted water gas.

I will now continue my quotation from the report:—

> It is impossible to ascertain with strict accuracy the death-rate from gas poisoning in this country, either before or since the introduction of water gas. The returns made by the Coroners vary too much in form, are too vague, and too often omit all reference to the medical evidence which may have been given. During the course of our enquiry several deaths have occurred from poisoning by illuminating gas under essentially the same conditions, and have been returned variously as "accidental death," "death by misadventure," "death by gas poisoning" (without indicating whether or not there was carburetted water gas present), "natural causes," and "death by carbonic oxide poisoning." No very satisfactory conclusion as to the effect in the United Kingdom of the introduction of water gas can yet be drawn from the facts and figures available.

In spite of these explicit statements, I have reviewed the British conditions at some length owing to references in the appendices of Dr. Haldane and Dr. Parsons. The report of the whole Committee, however, admits that there is no case against water gas in this country. We turn then to American conditions. In my evidence before the Committee, I gave a comparison of carburetted water gas and coal gas distributed in the United States, Jan. 1, 1897. Since that date 95 additional water-gas installations have been effected, with a capacity of 95,600,000 cubic feet daily; there being practically no coal gas construction during this period. The extensions last year were three times as large as in any previous year; and it is now estimated that nearly 80 per cent. of all gas made in the United States is carburetted water gas. I am far from claiming that a majority may not be wrong. Indeed, it has been tersely said that "the minority is always right." Still, when this correct minority, representing nascent improvement, has through the strength of its position been converted into an overwhelming majority, it is surely fair to cite these conditions as reasonably conclusive evidence.

I now come to the question upon which the report finally rests—*American Vital Statistics*. No one will deny that comparison between Great Britain and America must be made with caution. The old and the young are ever judged by different standards. But America is not merely young. She is an infant phenomenon; the giant issue of the giant century. Some of the more venerable among us might well exclaim "Made while you wait!" We can believe that all countries have been young, and we are told that history repeats itself; but the world's other history does not suggest the briefest parallel to the red-letter chapter by America. It is circular reasoning to remark that such a phenomenon could not result from common causes, nor flourish under usual conditions. What, then, are the special features other than ordinary youth to be reckoned with in American circumstances? I am not able to define these national conditions. Even the term "National" is erroneous, inasmuch as they vary as widely between different parts of America, as between America and Europe. But I can at least suggest a few points which your imagination will amplify in more or less direct connection with the question of gas supply.

Consider, for instance, the terrible volume and, in large measure, the more terrible character of immigration at the ports of New York, Boston, and San Francisco; thence overflowing to the great inland cities, notably Chicago. Opening our arms to petty criminals, drunkards, paupers, and imbeciles, officially expatriated for their countries' good, we were rightly termed "the dumping ground of Europe." The wonder grows that any country and any government could have swallowed this raw material with no worse result than occasional dyspeptic symptoms. But is it not far more wonderful that the inhabitants of the seaboard towns—those watchers at the gates—and of the inland *rendezvous*, Chicago, have avoided dire catastrophe? America is a large country, thickly strewn with potential human leaven; yet stringent Act of Congress was finally necessary to prevent the heaviness of the loaf. Consider, then, the congestion of this immigrant mass in the few ports of landing, where the process of natural selection domiciled the more indigent and ignorant; leading to the interior, as a rule, those possessing resource of character and coin. Is it strange, is it alarming, that recent gas statistics disclose a state of affairs in those towns unknown here? Would it not be surprising were it otherwise?

Taking Boston as by far the most remarkable instance, is it not reasonable that the able and perennial Chairman of the Massachusetts Gas Commission should feel the burden of this extraordinary responsibility, and seize with an iron grip any proffered relief? Yet when the Legislature of Massachusetts, in January, 1897, ordered this Board to report to them the causes of deaths from asphyxiation in Boston during the current month, with recommendations for preventive legislation, the reply may be summarized as follows:—

I.—Description of Cases.

	No. of Persons in Room.	Contents of Room in Cubic Feet.	Circumstances.
(1)	1	1000	Slept overnight with small heating stove full on, unlighted.
(2)	3	516	Slept overnight with burner passing 9 feet hourly, unlighted.
(3)	2	574	Saturday night until Monday morning with burner "wide open" unlighted. Apparently drunk.
(4)	2	744	Slept overnight with burner passing 10 feet hourly unlighted. Both drunk; one apparently consumptive.

II.—Recommendations.

The recommendations of the Board in so far as they refer to burners, fixtures, &c., are cited at considerable length by Dr. Parsons in his appendix; but with reference to carbonic oxide, he merely observes that they do not raise the question of reviving its limitation. I think, however, that they not only raise this question, but substantially dispose of it. I will read the extract :—

The gas in general use in twenty-five of the larger cities and towns in the State is what is commonly known as water gas, or a mixture of coal gas and water gas in varying proportions. Its distribution was formerly prohibited in this State; but was allowed by an Act of the Legislature in 1890, with little or no opposition, after the subject had been carefully and exhaustively considered at previous sessions, and its advantages and disadvantages had been fully weighed, not only by Committees of the Legislatures, but apparently by the Press and the public. No legislation of which we have any knowledge has elsewhere been adopted on account of accidents arising from its use.

There is a consensus of scientific opinion that the most dangerous element in illuminating gas is carbonic oxide; and that, while other elements may produce asphyxiation, this induces a poison through changing the character of the blood. All illuminating gas contains some carbonic oxide, and any kind is therefore dangerous to life if it is not burned but breathed. So also gas, which is entirely harmless in the hands of those who exercise reasonable care, may, with all other conditions alike, be very dangerous in the hands of the very careless or ignorant. The percentage of carbonic oxide in the gas in this state varies from about six to twenty-five, according to the method of its manufacture and the amount of so-called water gas which it contains. It has been satisfactorily shown in laboratory experiments that a very small percentage of this gas in a tightly closed apartment will speedily and invariably cause death; and if the same conditions were met in actual experience, the same results would probably follow. The question of what percentage of this gas may advisedly be allowed in illuminating gas is a very perplexing and difficult one to solve satisfactorily, particularly because, in the investigation of specific cases, great difficulty is experienced in securing adequate and reliable information. In some instances, it is apparent that the inhaling of gas alone would not have produced death but for its combination with diseases existing at the time. In some of the cities supplying this kind of gas, no fatal instances have ever occurred from its use. Numerous cases exist where two persons are subjected to the same gas in the same room, under apparently the same conditions, where one dies and the other recovers. The cases which occur from the breaking of mains in the streets may be considered as constituting a distinct class.

During the period named, there have been thirteen instances in which 75 people have been rendered unconscious, of whom 63 recovered.* If we were to classify all the cases in another way, we would find that in the seven years during which water gas has been in use, with the exception of those due to broken mains and imperfect fixtures, all the instances reported to the Board have occurred through what seems to have been a lack of reasonable and ordinary care on the part of the victims. All these cases, it would seem, might have been prevented by the exercise of less care than is probably necessary to avoid an electric car in a crowded street. How to provide by legislation against instances which are due to such a cause, is a subject of extreme difficulty. That illuminating gas is highly dangerous when used for any other purpose than to be burned, and that due care in respect to it is necessary if it is to be used with safety, is well known.

This is signed by all the Commissioners.

Again, the report lays great stress upon the fact that the table of Boston fatalities shows no instance in East Boston or in the suburban district of Jamaica Plain; both coal gas exclusively. It is well understood that the populations of these districts are thrifty, intelligent householders, no more likely to blow out the gas than dwellers in the West-end of London; whereas the accidents have occurred almost exclusively in the cheapest class of tenements and lodging-houses in the old city. But, if this explanation be insufficient, I may point out that the table likewise shows no fatality in South Boston—water gas exclusively, with an output and number of consumers equal to both East Boston and Jamaica Plain joined together.

The appendicists, however, assert that in Boston, as elsewhere, the case has become serious only since water gas was introduced. I suggest—and in many respects my remarks apply to all American towns—

1.—*That the records are more complete since that time;* and I refer to the evidence of Mr. Humphreys—especially as contained in Appendix VI., C. In consequence of the present ventilation of this question, similar causes will doubtless operate to some extent in this country; making it eventually necessary to account for apparent future increase in deaths from illuminating gas, by reference to the extract last quoted from this report, and to the final recommendation of the Committee—viz. :—

Lastly, we are so much impressed by the insufficiency and untrustworthiness of the statistics relating to particular causes of mortality which can be gathered from returns of Coroners' verdicts, that we venture, though the matter is outside the terms of the reference to us, to recommend strongly that some steps should be taken to secure that these verdicts should lend themselves more readily to clear classification by the Registrar-General; and, in particular, we suggest that in every case where the Coroner is in possession of a medical certificate of death, or where medical evidence has been taken at the inquest, a copy of that certificate or an abstract of that evidence should be appended to the Coroner's certificate when sent to the Registrar-General.

In view of the evidence as to the present condition in this country given by the Statistical Superintendent of the General Register Office, it is surely not surprising that infinitely greater indifference prevailed in America, prior to the excitement aroused by the early water-gas controversies.

2.—*That it is since the introduction of water gas that the use of gas has been pushed into the exceptional lodging-house districts which now provide the record.* This is due to two causes. First, the great reduction in price and improvement in quality, making gas-light, all things considered, cheaper than oil-lamps or candles, and consequently available for the poorest classes. Secondly, the great gas wars—that in Boston involving the hasty laying of 200 miles of mains by the Brookline Company, and corresponding extensions by the Boston Companies; the consequent canvassing for new consumers resulting in all manner of special inducements, including the piping and fitting of houses of a character never intended for gas consumption, and occupied by people unfitted for gas consumers.

3.—*That it is since the introduction of carburetted water gas that gas has been used for heating, cooking, power, and in numerous other directions, involving entirely new elements of risk.*

4.—*That it is the introduction of carburetted water gas which has led to the peculiar American condition of gas supply known as "Gas War."* In nearly all of the more important cities in America, carburetted water gas was first introduced by means of a competing company, who paralleled the mains and services of the existing undertaking. This, among other results, naturally led to a great increase of risk of accident through defect in the distributing systems. I may mention that, as Engineer and General Manager of an important New York Company, I have been into cellars of ordinary dwelling-houses entered by eight different service-pipes, each labelled with the name of the competing Company to whom it belonged; only one, of course, having a meter attached.

I have already referred to the gas war recently fought in Boston; and within the past few weeks a similar state of affairs has developed in New York. The legal charge for gas in New York City is $1 15c. per 1000 cubic feet, and an arrangement against counter-canvassing was supposed to have been in effect. I now quote from the leader in "Progressive Age," New York, May 15, 1899 :—

Meanwhile, at least two of the Companies were making yearly contracts at 90, 85, and, it is reported, even at the low price of 70 cents per 1000 cubic feet. No effort was spared to induce consumers to leave one company for another. Stores and factories were equipped with Welsbach lights without charge. We are told cash bonuses equal to a month's gas bill have been given. Those who have received this liberal treatment claim that $250 to $300 "rebate" has been by no means uncommon.

Finding the situation unbearable, the Consolidated and Mutual Companies on May 1 reduced their price to 65 cents per 1000 cubic feet, which was immediately followed by a reduction to 50 cents on the part of the New Amsterdam Gas Company.

In Kansas City, where I formerly managed the gas-works, the gas war caused by a competing company increased the annual consumption from 200 to 900 millions, or 350 per cent., in eighteen months. I think you will admit that this illustrates a national condition peculiar to America, which cannot fail to have wide influence upon relative vital statistics. It may be here noted that this same condition has given the public an opportunity to declare themselves with reference to carburetted water gas which could not exist in any other country. If the public had not wanted carburetted water gas, it is manifest that the competing companies introducing this gas would have succeeded poorly in their enterprise; but every such instance of competition on record has resulted in the coal gas supply being practically forced out of the market.

I think there is some disposition on the part of the Committee to confound suicides and accidental deaths. The Committee apparently lean to the view that, as suicides have increased since the introduction of water gas in practically the same proportion as accidental deaths, water gas is responsible for this increase. From the same facts I arrive at a very different conclusion. I say that the increase in the number of suicides is not only due to, but

* These instances appear to have been caused by a rival company entering Boston, involving the tearing up of 200 miles of streets, coincident with the tunneling of the city for a comprehensive system of underground electric railways.—A. G. G.

directly indicates, the operation of causes I have partially recited, other than the character of the gas. I accept the argument that the water gas controversy has resulted in educating the people up to a knowledge of the dangers of artificial gas; but this education has been directed as much against coal gas as water gas. I do not believe that a person contemplating suicide has ever been influenced by the analysis of the gas supply. I doubt if any such person has ever realized what kind of gas was being employed.

I would here state my belief that many of the cases returned as accidental are in reality suicidal. Not only is there evidence for this conclusion, but it is manifest that a verdict of suicide could be returned only in case of perfectly conclusive evidence to that effect. This generally consists of a letter announcing the intention of the deceased, or of visible suicidal arrangements. But the characters of people differ. While some are naturally theatrical, even in extremity, others—I should think the greater proportion—would endeavour to shun both the publicity and the stigma of suicide. Furthermore, many people coming to America, or moving from one locality to another therein, are for various reasons *in extremis*, and making their final effort. If this results in failure, there is perhaps a special inclination to suicide; but as they have neither friends nor insurance company interested in the circumstances, no evidence is forthcoming.

Then there is the all-important climatic condition. The rigour of the Boston climate causes double windows to be largely used in winter, with every other precaution against draughts and ventilation; and, in common with all Northern American towns, few houses contain fireplaces. A fireplace, even without a fire, is ordinarily—certainly in cold weather, when the windows would be closed—an effective ventilator. The heating in larger buildings is by steam and hot water, and in smaller houses by hot air, not always free from furnace gases. The climatic effects on the street mains and services are likewise severe, owing both to the movement of the pipes through great extremes of temperature, and to the movement of the ground by deep winter frost. Were I to suggest a comparison between summer and winter in England, the absurdity would be evident; yet possibly even greater allowance should be made in a comparison between England and Northern America. For these reasons we, under Northern American climatic conditions, do not look for anything approaching the immunity from gaseous accidents enjoyed in this country.

A contemporary question occupying the attention of Parliament affords further example of international difference. I refer to automatic car couplers. With a much smaller number of railway servants and cars, and a much smaller train mileage (although a greater mileage of track), the accidents in the United States during 1897 in coupling and uncoupling cars were 6497, including 214 deaths; whereas last year in this country the total accidents from this cause were 499, including 18 deaths. Yet just appreciation of American automatic methods has led to the proposal of a Government Bill making such appliances compulsory in this country, on the ground that, prior to their use in America, these yearly accidents were as high as 11,710, including 433 deaths. In other words, with approximately similar manual devices, and less volume of risk, America reports more than 23 times the number of injuries, and 24 times the number of deaths, caused by the same operations in this country.

With the certainty of exceeding my time and your indulgence, it is necessary to make further specific reference to the appendix of Dr. Haldane. I will omit intermediate argument, and confine myself to a brief consideration of his premises and conclusions. This, while reducing the tax upon your patience, has the advantage of sharply defining the line from cause to effect, and eliminating mental bye-ways and *cul de sacs*. We have frequent cause to regret and marvel at the lack of absolute knowledge of fluids so long and so widely known as the common gases; and the sense of personal gratitude with which I acknowledge Dr. Haldane's splendid and original work in that field would lead me, if possible, to honour his present conclusions. I am obliged, however, to express the opinion that his foundation premises are a set of selected and misleading figures, lifted bodily out of their context; whereon, by means of a superstructure of the purest conjecture, he establishes conclusions of mathematical precision.

Notwithstanding the evidence from the General Register Office, and the extracts I have read you from the report of the whole Committee, Dr. Haldane in his appendix finds justification for claiming an increase of six in the annual death-rate of this country, due, "largely at least, to the admixture of carburetted water gas;" for the reason that "the increased consumption of gas would not by itself account for the increase of deaths." I emphatically question his figures and his argument; but assuming both, I may mention that the risk is not measured by volume of gas consumed, but by the number of persons using it. Since the introduction of water gas in 1892, the number of consumers in London and the environs has increased over 70 per cent.; due almost exclusively to the use of prepayment meters by people unaccustomed to gas. Not only have small gas-stoves been introduced in connection with the bulk of these meters, but the general use of gas for heating, cooking, and other purposes has been greatly extended during this time, involving, as I have elsewhere pointed out, a new element of risk.

Dr. Haldane next finds the death-rate in the Garston district, during the period when pure carburetted water gas was distributed, "quite as high as in Boston." I have already dealt with the Liverpool circumstances at what you will consider quite sufficient length, and pass at once to *his final result*—a death-rate in this country of 1600 per annum, with the same proportion of carburetted water gas distributed in the United States. I reply that during the period under consideration about two-thirds of the gas distributed in the United States was carburetted water gas. Consequently, the complete substitution of carburetted water gas for coal gas in the United Kingdom would, on a directly proportional basis, result in 2400 deaths. But, inasmuch as a large volume of American water gas is distributed mixed with coal gas, the application of Dr. Haldane's cube rule, instead of simple proportion, would greatly increase this number. I am conservative, therefore, in taking 2400 as Dr. Haldane's ultimate figure.

Dr. Haldane quotes a table of the Massachusetts Commissioners showing that every fatality in the State of Massachusetts during the past eight years (with the exception of five due to broken main and service pipes—from causes already indicated—two accidents to gas employees, and three accidents from faulty house-pipes), has resulted from bedroom burners or gas-stoves being full on during the night. Now the use of carburetted water gas cannot affect the *number* of accidents; it could only affect their character. Consequently, according to Dr. Haldane, there are *at least* 2400 cases recurring annually in this country, unrecorded and unnoticed, under conditions which, also in this country, produce deaths without occasioning surprise. We have also seen that these accidents are generally confined to peculiar tenement and lodging-house districts in Boston; hence, if we complete the analogy, it further means that these 2400 cases unknown are largely concentrated into special districts of the principal towns. I may be unduly credulous, but I can easily believe that not a dozen unknown cases occur yearly in this country, where a sleeper is exposed during the entire night to unconsumed gas from an open burner. Yet such a condition is by no means necessarily fatal with carburetted water gas.

In his table of premises, Dr. Haldane mentions 88 towns throughout the North American Continent where no fatalities were recorded from 1875 to 1885 as due to coal gas. These are taken from a table prepared by Dr. W. S. Abbott in 1885 opposing the manufacture of water gas. I have already indicated why these early reports are utterly without value; but, if such evidence is to be considered, I may add that even Dr. Abbott's own list named a dozen towns using water gas without accident. While as recently as 1898 the Commissioners, writing of Massachusetts, say: "In some of the cities supplying this kind of gas no fatal instances have ever occurred from its use." I deprecate the importance attached by the appendicists to Dr. Abbott's evidence, for the reason that the Massachusetts Hearings show him in the light of partisanship.

It appears that in 1883 he opposed the use of carburetted water gas on the ground that it was inodorous. In 1886 he excuses this elementary blunder by saying: "Since the cases which occur, occur almost entirely during sleep, the lack of odour has nothing to do with the question;" and endeavours, by this extraordinary plea, to show why, as a Health Officer, he did not oppose

Place	Kind of Gas Distributed.	Annual Deaths by Gas Poisoning for a Gas Distribution equal to that of London in 1896.		Annual Deaths by Gas Poisoning for a Population equal to that of London (6 millions).		Years.
		Total.	Accidental.	Total.	Accidental.	
England and Wales	Coal gas	3·0	3·0	3	3	1886-91
England and Wales (outside London)	Coal gas only	4·2	3·4	—	—	1896-8
England and Wales (outside London)	Coal gas partly mixed with water gas	10·4	9·5	—	—	1896-8
88 American towns	Coal gas	—	—	3	—	1875-85
Boston	90 per cent. water gas	620	460	520	390	1896-7
New York	80 per cent. (?) water gas	275	130	263	124	1896-7
Brooklyn	97 per cent. water gas	400	215	235	120	1896-7
Chicago	100 per cent. water gas	—	305	—	155	1890-2
San Francisco	70 per cent. (?) water gas	—	—	940	270	1895-7
Philadelphia	38 per cent. water gas (not mixed?)	240	122	172	87	1896-7
Baltimore	100 per cent. (?) water gas	—	—	120	—	1895-6
Washington	100 per cent. (?) water gas	—	—	295	175	1896-7
Toronto	50 per cent. water gas (mixed)	45	—	32	—	?-1897

the Bill passed in the previous year authorizing the manufacture of *uncarburetted* water gas. A judicial mind could scarcely regard with equanimity the use of inodorous uncarburetted water gas for heat and power purposes, while bitterly opposing the use of carburetted water gas for illumination.

Dr. Abbott apparently failed to convince his own Board; for the Chairman of the State Board of Health, Lunacy, and Charity, who was examined a week later, after explaining that Dr. Abbott merely expressed his individual opinion, said:—

> I know that the members of the Board of Health look upon this question as it appears before the Legislature, as a controversy between manufacturers; and that, under the circumstances, it would be, as the matter is being discussed by rival commercial interests, inadvisable for the Board itself to express an opinion.

In view of the statement from the Chief of the Bureau of Gas of Philadelphia (see Mr. Humphreys' appendix, page 114) it is somewhat discouraging to find that city in Dr. Haldane's table of premises. Mr. Park writes:—

> According to the Coroner's report for 1896 there were in the City of Philadelphia 21 deaths from accidental suffocation by illuminating gas. Investigation of the records fixing the location of 19 of these—the other two not being found—has shown that two of the cases occurred in places where coal gas and water gas were probably about *evenly* mixed; that nine occurred in districts where water gas mixed with coal gas was supplied; and eight occurred in districts where coal gas was supplied. Of the deaths due to the inhalation of water gas, three occurred at the same time and place. If we call this one instance, it would make seven for water gas and eight for coal gas.

Hence, to make good his deduction of 122 accidental yearly deaths in London, on the Philadelphia basis of supply, Dr. Haldane must show that there were 122 annual accidental deaths in London *with coal gas*. During 1896-7 there appear to have been three deaths annually in the Metropolis; although in certain districts a large proportion of carburetted water gas was distributed.

I can support the above analysis by later figures. In 1896-7, with 37¾ per cent. of water gas distributed in Philadelphia, the deaths averaged 34, of which 17 were probably accidental. In 1898, with 53 per cent. of water gas, there were 28 deaths, of which 12 were probably accidental—an increase of 40 per cent. in the proportion of water gas, with a decrease of 30 per cent. in accidental deaths. Furthermore, a change in the Gas Administration. On Jan. 1, 1898, resulted in a vast increase in consumers, consumption, and distributing system during the year.

The favourable comparison of Philadelphia and Baltimore with the other towns in the table is evidently not due to the relative proportion of water gas distributed. The recent deaths in Philadelphia have been in inverse ratio to the proportion of water gas; and Baltimore, with 100 per cent. water gas, is the most favourable place in the list. Their comparative immunity is attributable to a class of inhabitants which has earned Philadelphia the name of "The City of Homes," and to the fact that, of all large American towns, these two attract fewest low-class nomads. I am in touch with Philadelphia circumstances for the reason that my headquarters were for six years in that town. My knowledge of the other places in the table is of a general character. I have more than once, however, heard the Chairman of the San Francisco Gas Company refer to the general use of gas by the large Chinese population; and I suggest that no one who has visited "Chinatown," with its small, wretchedly ventilated, over-crowded, and largely underground rooms, will find the figures astonishing. The fact that, in all, only 16 deaths were recorded as accidental out of a total of 62 gaseous fatalities in 1897, indicates the character of the population.

Washington is the capital of the United States, and the circumstances prevailing there may be summarized in two proverbs: The slogan of American politics, "To the victors belong the spoils;" and, "Wheresoever the carcase be, there will the vultures gather together." Universal suffrage brings to the American capital hordes of place-seeking yokels, negroes, and others likely to blow out the gas. In this connection you may recall the comparatively recent march of Cox's industrial army upon Washington, and the national apprehensions it excited. In 1897, there were five deaths recorded as accidental and seven suicides in the district of Columbia.

With reference to Dr. Haldane's concluding section, "The Products of Combustion of Coal Gas and Carburetted Water Gas," I will merely give the opinion that his appendix might have gained weight had he omitted this statement altogether. He deals therein, not with questions subject to personal conjecture, but with matters of common knowledge, concerning which the Committee need not have been left in doubt. I would here repeat the expression of my greatest respect for Dr. Haldane's intellectual and scientific attainments; but I am bound likewise to express my belief that he has fallen into grave errors of positivism regarding questions whereon his high powers of thought are unfortunately not tempered or directed by experience.

I think we have dealt with America sufficiently to show the utter impossibility of making arithmetical comparisons with this country. Would you say that, since a general election last year in North Carolina resulted in twenty deaths, therefore in this country, with thirty-fold the population, a general election must cause 600 deaths? Or would you apply this process of reasoning to cases of lynching or snake-bite? Such comparisons are no more erroneous in principle than the one under discussion; their absurdity is simply a question of degree. Instead of the danger of adoption being multiplied in the United Kingdom, it seems probable that enterprises might be carried on satisfactorily in this country, involving elements of risk which would be prohibitive in American atmosphere.

The result here of carburetted water gas distribution must manifestly be gauged by circumstances here existing. This fortunately involves no elaborate process of deduction. A practical demonstration has been in motion, for the past seven years, on an incremental scale that now comprises 62 companies and local authorities, representing most of the important towns in the kingdom. Carburetted water-gas plant is operating or constructing in the United Kingdom with a daily capacity of 102 million cubic feet—50 per cent. more than the joint maximum production of Scotland and Ireland; and many places are distributing as high a proportion of this gas as—barring emergency—they will probably ever require. Yet, in the Committee's words: No very satisfactory conclusion as to the effect in the United Kingdom of the introduction of water gas can be drawn from the facts and figures available. I explicitly add that, up to the present time, there is neither unfavourable change in the Registrar General's return of deaths from town gas poisoning, nor any evidence, when the cases are treated individually, that the displacement of coal gas by carburetted water gas has resulted in a single unusual death. Let the Government keep a hand on the throttle, if they wish; but, in view of the facts I have imperfectly recited, I submit that there is no justification for present intervention.

PAPER AND DISCUSSION.

DIFFERENTIAL RATES AS BETWEEN CONSUMERS OF GAS FOR LIGHTING, AND FOR PURPOSES OTHER THAN LIGHTING.

By THOMAS NEWBIGGING, of Manchester.

This subject has been treated before, more than once or twice, at different meetings of gas engineers. It appears to be necessary to resuscitate it periodically, in behoof of those having short memories; and, if possible, to prevent the introduction on the one hand, or the perpetuation on the other, of a system which not only has nothing to recommend it, but is objectionable from every point of view. I will not burden my remarks with many figures. Those who care to pursue the subject further, and are fond of statistics, can supply the figures for themselves. I prefer to make my paper conversational, rather than arithmetical. Besides, I have the fear of commentators before my eyes. These dry (not to say prosy) mechanical disquisitions do not go down with our journalistic critics. The popular treatment of a subject in a suggestive rather than an exhaustive (or exhausting) manner is what is desired in these stressful times, especially in the Metropolis and under the hot sun of Mid-June.

I desire to enter my strong protest against an injustice which is, I will not say widely prevalent, but is gaining some ground in the gas industry, and which in its outcome must tend to do it injury. There are in the United Kingdom 57 gas companies and 32 local authorities owning gas-works, who sell gas for cooking, heating, and motive power, at a lower price per 1000 cubic feet than the same gas for lighting purposes. Consequently, as I hold, there are in the United Kingdom 57 gas companies and 32 local authorities owning gas-works, who are dealing unfairly by their gas-for-lighting consumers. I will endeavour to prove this simple proposition. Several of these sell the gas to the gas-for-cooking-heating-and-power consumers at cost price, if not at an actual slight loss; and on the plea, as one manager expressed it, that "it is a good thing to have customers burning gas all the day."

This reminds me of the old lady who kept a shop, bought eggs at twelve for 6d., and sold them at the rate of thirteen for the same money. On being expostulated with, she admitted that there did not seem to be much profit on the transaction, but at least it was "turning the penny." Possibly it is the quantity that pays, as another illogical trader explained; or is it an exemplification of the ability of some people to live by their losses? This day consumption, if not viewed from a commonsense standpoint, is a mere fetish; worshipped without intelligent knowledge. Encourage a day consumption by all proper means; but not at the cost of inflicting an injustice. Do it by reducing the price of the gas all round, and not by favouring one customer to the disadvantage of another. The gas which both classes of consumers use is one and the same. Its prime cost is the same whether it be used for lighting or for purposes other than lighting. A statement of that kind, indisputable as it is, ought to settle the question.

The assumed advantage of the day-gas consumer is that he burns gas when the mains would otherwise be lying idle and unproductive; and so there is a saving of capital by the more complete utilization of that on which capital has been expended. But there is a fallacy here. Most of the so-called day-gas consumers are not so, pure and simple. Much of the consumption for heating, cooking, and power takes place during the lighting hours both morning and night, and not exclusively during the daylight hours. There is thus an over-lapping which vitiates the assumed special advantage of the day custom, inasmuch as the mains have to be of capacity sufficient to serve for the night, and a portion of the so-called (but mis-named) day consumption. "But," says one, "seeing that our day-gas consumer is also a night-gas consumer, he should have special consideration: Codlins, in this case, is our friend, not Short."

Admitting that contention for a moment, what special consideration does Codlins get in the rate differential? Surely, little or none. The difference in price for the two classes of consumption is simply a putting into one pocket money which has been abstracted from the other. If the balance is not rectified in that way, then it comes from the pocket of Short. But look at the inconsistency of the practice. In the winter months, as I know from experience, a very considerable consumption takes place in the lighting of ordinary gas-jets for the warming of rooms in cold weather. A day-gas consumer of this kind receives no special consideration whatsoever from your advocates of the differential rate; and for the reason that he chooses to warm his room by means of an ordinary gas-jet, instead of with a gas-stove or an open gas-fire.

It is to be noted as a very significant circumstance that, with but two or three exceptions, the 89 companies and local authorities who resort to this unfair dealing are dear gas-for-lighting sellers. Of the lot, only seven of them charge gas for lighting below 3s. per 1000 cubic feet. That, of course, is what might be expected under the circumstances. The reason is obvious, and it enforces my argument: A high lighting price is maintained in order to keep down the price to the other favoured class of consumers. Was ever anything more obnoxious and unfair? Who, after all, is the gas manufacturer's best customer? Which is the goose that lays the golden eggs? Unquestionably it is the gas-for-lighting consumer. Taking him all round, he is the largest consumer; of that there cannot be a dispute. It is mistaken judgment, where it is not sheer ingratitude, to charge our oldest and best consumer a higher price than the other. Competition with oil and electricity is greatest in the lighting department of our business; and yet there are those who handicap their best horse by putting a heavier charge upon him.

This handicapping of the gas-for-lighting consumer, looked at aright, will be found to be at variance with all sensible business methods. No merchant would think of charging a customer a higher price for goods by reason of his coming every day to buy at those hours when he (the merchant) was busiest. On the contrary, his song would be "Let 'em all come;" and, if need be, he would enlarge his staff and his premises to meet his customers' needs and convenience. Again, say you go into a shop and ask for a pound of butter. The shopman in answer might say (imitating the way of some gas men): "This butter is 1s. a pound if you intend to butter loaf bread with it; but if you are going to use it for buttering tea cakes it is 1s. 2d. a pound." If your indignation did not get the better of you, you would laugh at the fool of a shopman for his absurdity, and ask if he was quite *compos mentis*.

If there is to be a differential rate, let it be to the large consumer irrespective of the particular use to which he puts the gas. Be content to let him make a church, or a mill, or a haystack of it, so long as he pays for what he gets. That kind of differential rate is quite legitimate; provided that judgment is exercised in determining its fair proportion. I say nothing about the complication of having two meters and two sets of internal fittings, though that is objectionable enough. What I protest against is the injustice that is being done to consumers who happen to use gas for lighting only, and who are virtually compelled to contribute towards the supply of other consumers who use the same gas for a purpose other than lighting.

Let me give a concrete example: A Company is now in Parliament seeking, among other things, for power to supersede a clause in a former Special Act which provides that the charge for the public lighting shall not be more than the lowest charge to any other consumer. With the blindness which characterizes much of our legislation, the Bill has passed one House, giving the Company power to lower its charges to heat-and-power-gas consumers without at the same time reducing the charge for public lighting.

The result in this case will be, if the Bill goes through, that a peddling consumer who burns a few thousand cubic feet for cooking purposes, will have his gas at a lower rate than an important Corporation whose consumption for lighting amounted last year to no less than 171 million cubic feet. The Secretary of the Company in question, in the course of giving evidence, stated that he saw his way to the Company selling gas to consumers for heating, cooking, and power at 6d. per 1000 cubic feet below the present selling price.

I have made an analysis of the Company's revenue account for the year 1897 (the last account to which I have had access), and I am enabled to show that there would be a positive loss of revenue in adopting the proposed differential rate as between the two classes of consumers. It will be seen from this statement that the surplus left from the revenue, after making all payments for coal, working expenses, and capital charges, is only 0·45d.—less

than one halfpenny per 1000 cubic feet of gas sold. It is obvious, therefore, that any reduction in the price to those consumers who use the gas for cooking, heating, and motive power, must result in a deficit of revenue, which will have to be counterbalanced by an increase in the price to gas-for-lighting consumers, unless (which is not to be thought of) the Company elected to sacrifice part of its dividend. It is further obvious that any reduction in price which may be made to the consumers of gas for heating, cooking, and power, can only be accomplished by relieving them of their fair share of the fixed expenses, and throwing these (in addition to their own) upon the gas-for-lighting consumers.

The analysis is as follows:—

		Per 1000 Cubic Feet of Gas Sold.
Receipts—		
Net gas-rental		27·90d.
Meter and stove rental		0·83
Miscellaneous receipts		0·07
Coke		3·94
Breeze		0·25
Tar		1·88
Ammonia		1·55
Total receipts per 1000 cubic feet of gas sold		36·42
Payments—		
Coal	14·09d.	
Working expenses	13·83	
Total payments for manufacture and distribution, per 1000 cubic feet of gas sold		27·92
Gross profit		8·50
Capital Charges—		
Interest on loans	1·40d.	
Maximum dividend	7·00	
Total capital charges per 1000 cubic feet of gas sold		8·40
		0·10
Received—Interest on invested funds		0·35
Surplus		0·45

Then how is the reduction to be brought about without either raising the price to the gas-for-lighting consumers or reducing the dividend payable to the shareholders? Clearly, reliance is being placed on the natural growth in the Company's business to shortly yield the needed surplus. No attempt will be made at a reduction until the increment arising from this natural growth has produced such a balance of profit as will admit of a tangible reduction being made to the favoured class of consumers. In other words, the increase in the profits beyond what is required for working costs and capital charges, due to expansion in the Company's operations, and to which expansion the gas-for-lighting consumers will have contributed their share, is mortgaged beforehand for the special benefit of the other class. This being so, Peter is robbed to pay Paul; for it is evident that the gas-for-lighting consumers may whistle for their share in the reduction to which they are justly entitled, and which they would get provided a uniform rate were charged to all consumers alike.

Thus we see that there are two ways of robbing a man. He may be robbed: (1) Directly, by abstracting the cash from his pocket, or (2) he may be robbed indirectly by his being prevented from reaping the advantage which is his due, and which, but for an unfair action, he would have reaped. It cannot be too often repeated, therefore, that differential rates as between the different classes of consumers are grossly unfair, and that the principle when looked into cannot be defended. It is a mere accidental circumstance that one consumer uses gas for lighting and another for heating and power. They are both consumers of one and the same gas; and they should each in fairness contribute their share, in proportion to their consumption, to the cost both of manufacture, distribution, and capital charges.

No doubt a day consumption reduces the working expenses, and so cheapens the cost of production; but that being so, how much more must the heavy night consumption do the same, because here is a complete utilization of the capacity of the mains, whereas the other is only partial. The absurdity of the claim to special advantages for the day-gas consumer has only to be stated in this way to be perceived. As a matter of fact, the effect of any consumption, whether by day or night, is to utilize capital and modify the working expenses; but where would the day consumption as a dividend-earning instrument be without the night consumption? The cheapening process, then, should extend to all gas consumers alike, and not to one favoured set. Take the case of the shopkeeper: In scores of instances he sets up a brilliant illuminating display far in excess of what he needs for the mere lighting of his premises. He does this by way of advertisement; and yet under the objectionable regulation he is not entitled to, or at least he does not receive, the special reduction. Compare him with the man in the next street. The latter has the electric light throughout his premises, with the exception of one gas-jet in the cellar, and a gas-griller in the kitchen. These are supplied through two separate meters; and by the differential scale he gets his paltry modicum of gas at a price lower than the other who burns, it may be, fifty or a hundred times more.

These considerations accentuate the unfairness of differentiating the price, as between the two classes. In point of fact, as I have already said, the adoption of differential rates of this character prevents the great bulk of the gas consumers from reaping the benefit of a growing business. Again I urge, if there is to be a differential rate let it be for quantity, not for class consumption. Here is legitimate ground for some reasonable concession in price; and it would apply, of course, to gas usage of every kind.

One flagrant instance of the abuse to which differential rating lends itself has recently come under my notice. A certain board of directors consists of men who use gas somewhat largely for motive power. They have found it of advantage to avail themselves of the system; and have accordingly reduced the price for gas-engine purposes to a point which leaves little or no profit on the consumption. The company nevertheless pays its maximum statutory dividend. It needs not any special penetration to settle what other class of consumers is mulcted to pay such dividend, not only on the capital expended on their own behalf, but also on that which has been spent for the supply of the other. This is sheer robbery, of course. But, indeed, all class differentiating in price is robbery less or more.

As more particularly bearing on the question of public lighting, it should be remembered that, like the consumption of gas in the daytime, the public lamps, in most towns, burn gas during many hours in the night time, when but little gas is being used for other purposes. For that reason alone, it is but reasonable and fair that the gas so consumed should be charged for at a rate not higher than is charged to any other consumer.

If any of you, not having adopted this unfair kind of differential rating are thinking about doing so, pray abandon the idea. Deal justly by your consumers all round. Some managers are smarting under the infliction of the differential rate which has been introduced by their respective boards contrary to their advice. Others again, having advised, or having acquiesced in, the adoption of the system, cannot well recede from that which they have previously recommended. So, like the fox without a tail, they try to make a virtue of necessity, and continue to countenance and recommend the practice. But my advice, even to them, is to abandon a bad system, and gradually, as occasion admits, level-down the price to the gas-for-lighting consumers. It is never too late to mend.

Discussion.

Mr. S. W. Durkin (Southampton) considered members were much obliged to Mr. Newbigging for having given them a "plain unvarnished tale." Somewhat recently, in his district, there was a large works where they had been putting up several gas-engines, owing to the boilers having given out. They were splitting up the works into sections, and in each they were placing a gas-engine for the purpose of doing any repairs which might come in during the night. They applied to some directors of his acquaintance for a differential rate, on account of the large quantity of gas they were going to employ for these motors; and they threatened that, unless some difference was made, they would use Dowson or similar gas. They were, however, met with a direct refusal, and informed that they would only receive gas at the price at which it was supplied to other people in the district.

Mr. Tim Duxbury (Middleton) could not agree that Mr. Newbigging had given an "unvarnished tale." He thought it was very much varnished; and he almost entirely disagreed with it from a practical standpoint. Indeed, he thought that if Mr. Newbigging were a works manager he would not have written it. In the first place, he said the system had nothing to recommend it. Taking his own

case, when the price was 3s. 4d. per 1000 cubic feet, they tried in every way possible to increase the consumption; but it practically stood still, with perhaps an increase of 1 per cent. They then reduced the price for other purposes than lighting by about 6d.; and whereas they had only 60 cookers in use before, they now had 6000. They had also created a big demand for gas for use in gas-engines and for singeing purposes in the mills. He did not think it quite fair to take the total cost of the gas delivered to the consumer, because if they increased the consumption they had comparatively a greater profit on the increase than on the present consumption, as the standing charges were in many respects the same. Where gas was made for less than 1s. per 1000 cubic feet, the interest, depreciation, and outlay on services and cookers, &c., being 2½d., there was probably 1s. per 1000 cubic feet profit, because the standing charges were the same in either case. If the consumption of gas for lighting could not be increased, but, on the other hand, some of it was lost by the competition of electricity, another kind of consumption ought to be encouraged, in order to regain one's position—not neglecting lighting, of course. How could this be done unless they offered some inducement to people to use gas-cookers, &c.? Mr. Newbigging said most gas companies and corporations, where differential rates were involved, were charging 3s. and upwards for their gas; and he quite agreed with them. But how could they get the price down unless they increased the consumption? They might do it by remodelling the plant; but the Committee would not allow them to do that. They would not sanction the old plant being taken out unless it was too small or was worn out. If they wanted to bring down the price generally, they ought to encourage some other method of consumption by almost every available method. Since they had encouraged the consumption of gas for cooking, they had had an immense increase; and where they had lost a few consumers through electricity, they had gained large ones for singeing cloth and for other manufacturing purposes. It was stated in the paper that the differential rate simply meant putting into one pocket money abstracted from another. He, however, did not look at it in this light, but simply as a means of increasing consumption. At Middleton they had now decided on coming down to 2s. 6d. per 1000 cubic feet for heating purposes, and to 3s. for lighting. It would pay to use a cooking-stove or gas-fire at the former charge, but at 3s. or 3s. 4d. it would not; people could not be persuaded to use gas for this purpose unless they were offered an inducement.

Mr. T. Hands (Enniskillen) said the paper reminded him of the remark of the lady who saw a man kissing a donkey—"Every man to his fancy." Years ago he took charge of small gas-works making about 8 millions per annum with a high leakage. The shareholders received a very small dividend; and the first thing he had to do was to see what could be done to increase the consumption. He worked night and day at it for a while, and at last he brought the proposition before one of the Directors to offer a differential rate. The Director asked him if he thought it wise to make any difference. His reply was that if they would allow him to introduce the system he would guarantee to bring them through; and he was quite certain they could not find fault with him to-day. When he went, they had in the place only one gas-cooker, which was supplied straight off the main, and was paid for at a certain rate per quarter. There was not a single gas-fire, only one or two gas-engines, and one laundry. He went to work among the consumers to see what could be done; and he reduced the price from 6s. 6d. to 5s. for lighting, and to 4s. for gas-engines, cooking-stoves, and gas-fires. In eight years the consumption had more than doubled, the consumers were well satisfied, and the shareholders had always had their dividend; so he did not think there was anything to grumble about. His view was that they should encourage the sale of gas by all means, so as to compete both with coal for fires and with Dowson gas for engines and laundries. Laundry people could not pay 5s. per 1000 cubic feet for gas, but they could afford to pay 4s.; and the consequence was that they could employ about 500 hands where they could not do so before. Therefore, by encouraging cheap consumption, there was a benefit all round. Some of his friends might not call it cheap; but it was so in comparison, because the coal they had to use doubled its price before it arrived at their place. Consequently, they were selling gas as cheaply as some others.

Alderman Miles (Bolton) said he was about to venture the observation that the only fault to be found with the paper was that there would be no room for criticism of it; but his friend Mr. Duxbury and the last speaker had debarred him from saying that. Personally, he agreed with every word in the paper; and if he might venture to recommend Mr. Duxbury what course to pursue with gas at 3s. 4d., and a strong desire to reduce it to consumers for purposes other than lighting, he should say boldly: "Reduce the price all round," and then the complaint he made that there was no increased consumption for lighting purposes would disappear. This was their experience at Bolton. A short time ago, the price of gas was 2s. 6d. per 1000 cubic feet. But there was a great desire to reduce it; and it was very seriously considered whether or not they should lower the charge for motive power. He personally—and the Committee agreed with him—was never able to find any tangible argument why, if the price were reduced at all, it should not be all round. As Mr. Newbigging said, if they reduced the price to one class of consumers to an inordinately low figure, they must be penalizing those who had made the gas industry what it was to-day; and this must be wrong. At the same time, he was bound to say there were sometimes difficulties to grapple with; and they had one they were just now much troubled about, on which he should like to ask Mr. Newbigging's advice. One of the Corporation departments employed two 40-horse power gas-engines in the daytime for six months of the year. They were extremely anxious to use gas; but when they had to pay a bill of upwards of £500 a year for it, they naturally looked askance, and were asking for a tangible reduction. They were therefore face to face with a difficulty which they hardly knew how to get over, unless by granting a differential price. They had never done it yet to any consumer, large or small; and they were anxious to avoid it if possible.

Mr. E. H. Stevenson (London) said he quite agreed with some of the remarks made, that the paper was most admirable in its way; but when he said that, he was thinking of the story the late Corney Grain used to tell them about a man who was visiting a country house. He knew nothing about horses, and when he was shown over the stables and saw a horse, he said it was a very good horse in its way. The owner at once said it was the worst animal he had. But the visitor's reply was that it was a very good horse in its way, but it was a very bad way; and that was what he (Mr. Stevenson) thought about the paper. After all, what was the prime cost of gas? It was not the cost of manufacture; it was that *plus* the interest paid on capital. If they sold 100 million cubic feet of gas in a year to night consumers, and could, by reducing the price to certain classes of them, sell another 100 millions in the day time, the same mains did for the 200 millions. There was no more leakage; and the same gasholders were sufficient. Therefore, first of all, they had much lower charges for capital purposes and for leakage, and they could afford to sell their gas more cheaply. The first capital probably cost from 8d. to 15d. per 1000 cubic feet of gas sold. Now, however, with the auction clauses, for any extension of works the new capital would not cost anything like that—probably only 6d. per 1000 feet. But if they did not want more than half the capital for gasholders and mains, the charge came down to about 3d., and they could therefore afford to sell gas more cheaply if they sold it in the day time. This he considered was a very good reason for making a reduction to day consumers. The "geese" they had heard of were the night consumers. They certainly did bring in their profit. But if a manager could not increase his make of gas by getting a few more geese to consume it, he must get some other animal or bird to do so; and he could afford to get them in on much lower terms. Mr. Newbigging said the case from the opposite point of view was quite an absurdity. He (Mr. Stevenson) thought this was rather rough on those who hold different views; and he must say that his brain was not capable of considering anything else than the absurd point of view, if it were so. He was quite sure there was no class legislation at all in this. It was not done to assist a rich class; it rather assisted the poor. He was not a rich man, and never would be; but he wished the Company he took gas from would let him have it more cheaply for consumption in the day time, because generally from April to the end of October the gas was never out in his house unless some repairs were being done. He burnt it in the

day for cooking purposes and heating water, and at night for lighting. But he used a great deal more in the day than he did at night; and therefore he thought he ought to have a reduction for it. The price of gas at many of the places to which Mr. Newbigging referred was high; but it was much higher before the differential rate was introduced. They all knew that the standing charges formed an item, and in many cases a serious one; and every additional million cubic feet of gas they could sell, reduced these charges per 1000 cubic feet. Therefore, if by lowering the price they could augment the make and sale, and so reduce the cost, it was a perfectly reasonable thing to do.

Mr. J. C. Belton (Chester) said they were all indebted to Mr. Newbigging for the very clear and succinct paper he had given them; and he (Mr. Belton) must differ from some of the previous speakers who criticized the deductions drawn. Mr. Duxbury seemed to be in the unfortunate position of having a Committee who could not see that it was wisdom and their duty to reduce the cost in order to bring down the price, and not to bring down the price in order to extend the works. With regard to the principle involved in making a differential charge for gas used for special purposes, he agreed that it was commercially immoral, and unsound as well. It stood to reason that the cost of production for large quantities was less than for small ones; and the true basis of a differential charge, therefore, was the amount of consumption. If they encouraged large consumption by a differential rate in proportion to the quantity consumed, they were going on true lines; but to say that it paid to supply the owner of a cooker which perhaps consumed 100 cubic feet of gas a week at a cheaper rate than another private consumer who burnt perhaps 5000 cubic feet a week at night, was palpably a mistake. The cost of supplying for a special purpose a consumer whose consumption was not very large, was quite as great as supplying gas to an ordinary consumer for night lighting. Take, for instance, one consumer who had a burner in his cellar and a griller in the kitchen. They supplied him at a reduced price because he burnt gas for cooking; but his next-door neighbour only used gas for lighting, and his consumption was ten times as great. What an injustice it was to charge the large consumer a higher price for his gas than the one next door, who was only burning hundreds where the other burnt thousands of cubic feet. The cost of collection, inspection, services, meters, &c., was much greater in proportion to the consumption in the one case than the other.

Mr. John West (Manchester) said this appeared to be rather a controversial question. Some had said it was a matter of taste; while others said it was a question of equity. He was early taught to believe that, gas being a monopoly, all consumers should be treated alike—the large and the small. High and low, rich and poor, should all have gas at the same price, as there was only one place they could go to for the commodity. He had carried out this idea as far as he could, and he thought most successfully. For 25 years he was connected with gas-works where there was a very large day consumption, and where this differential system was not resorted to. Some few years ago, Mr. Newbigging collected statistics, and pointed out that there were two Companies who had a larger day consumption than any others, and these two happened to be those which he had been individually connected with for 25 years. These Companies had but one price; and their one idea was to educate everybody, and to point out the advantage of using gas for all purposes. So effective was this policy, that in early days, when gas was 12s. per 1000 cubic feet, it was used very largely for cooking. It was nonsense to talk about 3s. being too high, when people in Northampton and Maidstone paid 12s. per 1000 cubic feet for it for cooking, and found it economical, or believed so. When he went to Maidstone, there was a differential rate to this extent—that certain large consumers, such as the Asylum and the Local Authorities, had their gas much cheaper; but in the course of time he was able to bring them all on the same footing. Both Local Authorities and the Authorities of the Asylum saw the equity of this; and for years past all the people in the district had paid the same price. The advantage of this was that they got a very low charge all round. In both cases, he believed gas was now sold under 2s. 6d. per 1000 cubic feet. These facts were sufficient to prove that it was unnecessary to reduce the price for special purposes. Probably the Companies he referred to were the earliest to introduce cooking by gas, control over gas-fittings, &c. They were no doubt in the forefront at that time. He saw no reason why a differential rate should be introduced. It might, in very exceptional circumstances, be an advantage; but his great idea had always been that all gas engineers should educate the public, and point out to them by every means in their power the great advantage there was in using gas for all purposes. They need not be afraid of Dowson gas; for taking the actual heating power, and comparing it with coal gas, it was less efficient. He made some extensive experiments not long ago in that direction, because the Manchester Corporation said they should use Dowson gas if they were not supplied with coal gas cheaply. So he experimented, and found that, volume for volume, there was more heating power in their rich gas than in Dowson gas, and that it would be cheaper to use the Corporation gas. He convinced them of this; and the Dowson plant was not put down. He was also able, when in the South of England, by reducing the price, to get some of the coal-owners to shut up the small works of their own; but had he been charging more for lighting gas than for cooking, he could never have succeeded in doing this. His idea was one price—and that the lowest—to everybody.

Mr. T. Bower (Hartlepool) said his experience lay in a district where a very large proportion of the gas was used for motive power, cooking, and heating purposes. He was generally at one with the suggestions Mr. Newbigging had made, and was not disposed to differ from him with regard to cooking and heating. But with reference to the use of gas for motive power, he had a different opinion. He had several times literally found himself in this position: There were several ship-building yards, where electricity was the motive power, and where in the majority of cases the lighting was also done by electricity. He had been asked at what price per 1000 cubic feet they could supply gas for these purposes; and he found it was purely a matter of calculation with the owners of the ship-yards whether they would use gas or steam for the power they required. In one particular case, where the consumption was likely to be about 7 or 8 millions per annum, he was distinctly told they had worked out their calculations on the basis of present prices for coal, and that if the gas could be supplied at 1s. 9d. per 1000 cubic feet they would take it as the motive power, but if it cost more than that they would use coal. His people were not in a position to supply gas at 1s. 9d. per 1000 cubic feet; but they offered to do so at 2s. 4d., less 15 per cent. This was giving an extra 5 per cent. over the discount allowed for lighting, and brought the price down to something under 2s. They thought this was a fair offer to induce the new consumption; but it was not successful. Shortly after an almost similar case came before them, when the same offer was made, with the result that they eventually accepted the terms, almost under protest; pointing out that in Newcastle, Sunderland, and other seaports where the industry was worked on similar lines, they could get gas as low as 1s. 6d., and that consequently they were severely handicapped in working expenses. However, they did eventually accept the offer; and they were now consuming not less than 6 million cubic feet per annum for this special purpose. He maintained that if, by the offer of 5, 10, or even 15 per cent., one could get an extra consumption of 6 million cubic feet per annum, notwithstanding what Mr. Newbigging told them, it was perfectly justifiable to obtain the extra consumption, which he was quite sure would tend to reduce the cost to the lighting consumers sooner than would otherwise be the case.

Mr. G. R. Love (Dundalk) said he was one of the gas managers referred to in the paper who were smarting under the infliction of a differential rate; and he should not be surprised if the author had his works in his mind when writing the paper. Perhaps, therefore, his experience might be of some advantage to other managers. One of his Directors had a cooking-stove; and he supposed the cook lit the gas and kept it on all day. At any rate, he had a big gas-bill; and when he came to the board meeting he complained about the amount of gas he had to pay for, and after going into a lot of figures moved that the price of gas for heating, cooking, and motive power should be reduced by 1s. 1d. per 1000 cubic feet. This was supported by other members, and carried. The effect had been that the lighting consumers had been very much dissatisfied all round. One man asked why he could not get his gas at the same price as his next-door neighbour, who

had a little gas-fire in his stable and burnt no gas in the house at all. Another man wanted a gas-fire in his bedroom, and, of course, required a separate service and meter for it. It caused great dissatisfaction, and no end of trouble and expense in putting in services and meters. He did not agree entirely with what Mr. Stevenson said. Certainly the mains could carry gas during the day, and the holders, if large enough, might be able to supply the amount required. But take a works which had in winter time only a small margin over the maximum in the way of retort power. The retorts had to be renewed during the spring and summer; and if they were working very hard, extra retort power had to be provided, which added to the capital account. He was certain that in his own case the system kept back the reduction in price all round, which certainly would have otherwise been carried out.

Mr. JAMES STELFOX (Belfast) said the paper so thoroughly expressed his own opinion that he must really apologize for saying anything at all. One instance Mr. Newbigging had referred to was very suggestive. Take the case of a shopkeeper handsomely lighting his premises with ordinary gas-burners or incandescent lights, and paying the full price, while his neighbour just round the corner might be driving a gas-engine for the purpose of lighting up his shop by electricity. The latter got his gas so much cheaper for that purpose, which was unfair to the first man, with whom he competed. In the discussion, they constantly heard the expression "increased consumption," as if increase of consumption was everything, quite irrespective of the profit attached to it. In their own city, they had a few mills established many years ago; and in 1832 the people who had charge of the works chose to lay down 5 miles of mains to the mills, in order to increase consumption. This had been a cost to the lighting of Belfast from that day to the present; and even now he would not recommend it as a paying undertaking if it had to be done afresh. He did not see the use of increasing responsibilities, and always wanting to spend new capital, unless there was some return for it. Mr. Stevenson had very ably put the matter by saying that if 100 million cubic feet of gas were consumed at night, another 100 million could be supplied at a reduced price by day. But why should it not be put the other way? If 100 million cubic feet of gas were consumed in the day at a low price, why should not the other 100 millions be supplied at the same price at night? The argument of those who went in for a differential rate seemed to be that there must be a certain fixed price for lighting, whether people could afford it or not; but that people might have gas for other purposes at whatever price they could afford to pay. In one case, where 6s. 6d. was charged for lighting and 4s. for other purposes, they were told that the lighting consumer was content, which only suggested to him that the lighting consumer there must be the animal the lady, referred to by Mr. Hands, elected to kiss.

Mr. E. H. MILLARD (Durham) said he thought that the different positions could be reconciled by simply considering each case on its merits. He might refer to one very popular instance which had been noticed several times in the "JOURNAL OF GAS LIGHTING"—namely, Brussels, where, owing to a differential price being charged and a large consumption ensuing, they had been able to bring down the price all round, until now there was only one.

Mr. JOHN CARTER (Lincoln) said he thought the question was not one of principle, but rather of policy. He was entirely in accord with the principle the author enunciated, and was happy to say he had never had any experience of differential charges. There was one point which seemed to have escaped notice altogether, and that was the suggestion that it was perfectly legitimate not to differentiate between day and night consumption, but to make some allowance to the large consumer. He did not know whether or not the author would consider he was a dangerous Socialist; but he did think that this was utterly wrong, as it was making those who could ill afford to bear the burden pay for those who could better afford it—differentiating to the advantage of the large consumer, who, generally speaking, was the wealthier man.

Mr. MARK FLIGG (Redcar) said he had had experience in a place where the consumption was very limited, and the price very high. But they could not afford to reduce it—the dividend being low; and if their price had been brought down, it would have been lower still. Every effort was made to push the use of gas for cooking purposes; and an exhibition of gas-stoves had been held. But they could not get anybody to have them. Then they reduced the price 7d. per 1000 cubic feet for cooking purposes; and now they had about 2000 stoves in use, and some of the largest consumers were those who took a supply of gas for this purpose. In some towns where gas was cheap, this might not be necessary; but in small places he certainly thought the plan worked advantageously. Their make had very largely increased; and had it not been for this additional consumption, when the price of coal went up, they would have had to raise the charge for gas.

Mr. W. D. CHILD (Romford) said Mr. Stevenson had endeavoured to enforce his argument by saying that if 100 million cubic feet of gas were sent out for certain capital charges for gasholders and mains, this would not be increased by sending out an additional 100 million feet in the daytime But he quite failed to understand that, unless the gasholder capacity was already largely in excess of what was required. If there was to be a steady drain on the holder capacity during the whole day, as well as at night, it would entail a large amount of carbonizing plant in order to produce gas at the rate it was used.

Mr. STEVENSON said what he wished them to understand was that it would only require fresh carbonizing plant up to the purifiers. It would raise the capital account, but not to the same extent as previously.

Mr. W. SUGG (London) said it did not appear to him that sufficient attention had been paid to what Mr. Newbigging had said about having two meters in the house. Nobody seemed to address himself to the question of how the meter which was going to supply the day gas would be able to distinguish between the day and night consumption. There did not seem to be a possibility of any mechanism to do it, so that there must be two meters. Then suppose a bit of india-rubber tube got, by accident, between the day and the night meter, what would likely be the result?

Mr. ISAAC CARR (Widnes) expressed his entire accord with the arguments advanced in the paper, especially as they were in precise accordance with what had been his practice for many years past. He claimed to have attained some little measure of success in the sale of gas and in the increasing of consumption; and much of this was due, he believed, to his adhering to what might be termed a fair selling price. Some speakers had told them what differential charges for gas had done for them; but he could only say that uniform charges in his case had done more than anything he had heard advanced that morning. In a town of about 35,000 inhabitants, and practically a permanent population, over the last twenty years they had increased the consumers from 700 to 5500, and the make from 60 millions to 220 millions. If the gentlemen who had claimed so much for differential selling prices had only adopted a fair selling price all round, their progress would have been much greater, and they would have done greater justice to the consumers. Of course, they could all agree with Mr. Stevenson that the more the consumption of gas could be increased, the more the capital charges would be reduced; but this reduction should be shared equally by all the consumers. He hoped it would go forth as the consensus of opinion in the Institute that the ordinary selling price should be uniform. He was quite in favour of a differential price in proportion to consumption. Where one man used 10,000,000 cubic feet and another 10,000, the former was entitled to some consideration, because of the reduced cost of distribution. There was only one service-pipe, one meter, and one gas account.

Mr. WILLIAM CARR (Stalybridge) said a Company he knew had a small consumption for a very large capital; and he contended that if they could only increase their business, they could do something for the consumers all round. The question was how to increase the consumption. The goose had laid a single egg, but it would not lay two; and eventually they had resort to this differential rate. Like Mr. Newbigging, he was opposed to the principle entirely; but it was a question of expediency, and he thought Mr. Newbigging himself, although he had put a very strong case, would admit there were instances where it would be expedient to resort to some such means to try and get new consumers. He adopted a differential rate, and sold gas for heating and cooking purposes at a considerably lower price, and also gave special facilities for fixing cookers and gas-fires and putting in slot meters.

The consequence was that in six years they had doubled the sale of gas, and had been able to bring down the price for lighting purposes below the figure at which they originally started selling gas for heating and cooking. The new consumers therefore had helped to reduce the price to the old ones; so that the goose might miss a day now and then without laying, and yet the dividend not be impaired. He thought his brother had not properly stated the case at Widnes. Where gas could be made cheaply, there was little need for a differential rate; and he thought his brother had succeeded in making gas exceedingly cheap. Up to two or three years ago, they had about 2000 consumers. They gave special facilities for the application of slot meters; and they spent money in the houses by putting up chandeliers, brackets, pipes, and other things. The result was that in two years they more than doubled the consumers; but this was an argument in favour of Mr. Newbigging's paper. His brother did not charge a different rate—in fact, he believed he charged a little more to the day consumers. But still he did something out of the common, and in a sense might be said to rob the geese in order to hold forth a hand to the small consumers. It did not prove to be a robbery, however, but a benefit all round. He never advised a differential rate for cooking and heating; but he had done similar things to what his brother had done. He had given money away in the shape of small stoves, connecting them free of cost, and that sort of thing, in order to encourage consumption; and this was a matter of expediency which, he thought, had been thoroughly justified by the result.

Mr. Isaac Carr asked to be allowed to say one word in explanation. In Widnes they had a fair price, and sold to all ordinary consumers—slot and ordinary meters alike—as nearly as they could arrive at it, at the same identical price. It was quite true that the slot-meter consumers paid a little more; but the extra charge was only to repay the money spent upon their houses and fittings. They did not rob one class to help another.

Mr. Newbigging, in reply, said it would be quite impossible to deal with every one of the speakers; and he had not heard a single argument advanced which he had not previously met in his paper and refuted in anticipation. He was sorry that some strong expressions he had used had been taken rather to heart. The fact of the matter was that if one did not put some kind of pungent matter into a paper, it was apt to fall flat. For the consolation of certain gentlemen, however, he might say he had used the term "robber" in a Pickwickian sense. No one was more in favour of encouraging day consumption or summer consumption than he was; but what he objected to was unfair dealing between different consumers. He had explained that the day consumption in every case overlapped the night consumption; and, if so, where was the saving in capital? If the two came together either morning or night, it was evident that the mains and everything else must be made sufficiently large to supply the double consumption; and therefore there was no saving whatever in capital. The wear and tear of the retorts must increase in the ratio of consumption; so that there was no saving on that head. Rates and taxes were higher in proportion to the profits of the year; so that there was no saving there. So it was with the establishment charges. The salaries, it was thought, remained stationary. But even this was not so really; they advanced, or at any rate they ought to advance. With a growing consumption, whether winter, day, or night, he did not know of any single item on which one could really put his finger and say that there was a saving due to an increased day or summer consumption. But assuming that the day consumers in summer had the advantage (which was a large assumption), was it not the fact that the lighting consumers in the winter brought a greater advantage to the concern of which they were customers, and so the balance was rectified in this way? It was good to have a summer consumption and a day consumption; but what about the big night consumption? Was that to be ignored for the sake of the paltry consumption in the daytime? One or two speakers had put questions which he should like to answer as well as he could. Alderman Miles, who agreed with him in the main, put a special case of a Corporation who wanted to use gas for the purpose of driving gas-engines: How was he to get over the difficulty of their paying a large sum for their gas? In a case of this sort, where the consumption was large, extending to millions a year, he (Mr. Newbigging) would make a slight reduction; but he should be very careful that it was not an unreasonable one. In any case of the sort, there must be a saving in leakage, for one thing, in wear and tear, in collection, and in various other items, which went towards reducing the cost. But there was another way which he would recommend Alderman Miles to take to heart, and which he would find would be very efficacious in reducing the price all round, and that was to appropriate less of the profits in the reduction of the rates. This was the solution of the conundrum he had put. Mr. Stevenson said that for every additional million cubic feet of gas they could produce and sell, they reduced the cost of working. He (Mr. Newbigging) knew that very well; but what had it to do with the question? Let every one of the consumers have the benefit of the increased consumption. If it reduced the cost, it ought to be reduced all round. There was no reason why one class of consumers only should reap the benefit. As a matter of fact, whenever they began coddling, and devoting attention to one class of consumers, ignoring others, they prevented those others for all time from having another reduction. This accounted for the high cost which prevailed in those places where they had differential rates. Several speakers had given very pregnant examples in favour of the views he had expressed; and he did not think he ought to take up more time, but simply thank the members for the kind way in which his paper had been received.

Evaporative Condensation.—A paper on evaporative condensers for steam-engines was read before the Society of Mechanical Engineers at their annual meeting by Mr. Harry G. V. Oldham. It is worth studying by gas engineers, for the side-lights it throws upon certain problems of gas condensation. The author described many industrial applications of the principle of condensation by the agency of the cold produced by evaporation—a very old principle, not much used hitherto for mechanical engineering purposes. The paper introduced a new pattern of condensing pipe designed to utilize this principle, consisting essentially in making the cross-section of the pipe of a "heart-shape." These are intended to be ranged horizontally over one another, with the points downwards; and the idea is that a small stream of water, allowed to drip upon the slightly recessed top of the uppermost pipe, will flow in a thin film over the pipes, one after another. With a view of assisting equal distribution of the water, these pipes are made with ribs at frequent intervals, and are put together with flange joints. It appears that a pipe of this shape would not make a bad gas condenser. In the course of the discussion, Mr. Bryan Donkin and other speakers poured cold water, metaphorically speaking, upon the idea of the evaporative condenser, as applied to steam plants; and the whole tenour of the discussion indicated that not much is known of the subject. It was pointed out that the practical difficulties in the way of realizing the theoretical conditions of evaporative condensation—a thin layer or film of water flowing and spreading regularly over the pipe surface—are considerable.

Condition of Carbon in Iron.—In his address to the Iron and Steel Institute, Professor Sir W. Roberts-Austen offered some suggestive speculations as to the condition in which carbon exists in iron. The presence in iron of a few tenths per cent. of carbon, makes it steel. We do not know how the carbon acts to make the difference between iron and steel what is recognizable for a fact; but a step forward in knowledge has been accomplished by the recent conquest of the truth that there is absolute parallelism of the solution of salt in water and carbon in iron. The presence of 0·5 per cent. of carbon in iron lowers the melting point of the metal from 1600° to 1530° C. Pursuing his treatment of the subject, on the atomic basis, the President arrived at the symbol familiar to the chemist as the "benzene ring" of carbon. The result of treating carburized iron with various acids is the formation of marsh gas and more complicated organic compounds, of which propylene, acetylene, ethylene, and naphtha may be mentioned. To the query whether the nature of these products helps us to ascertain the number of the atoms of the carbon molecule as it exists in cold steel, the President answered that he had consulted organic chemists on the point, among others his colleague Dr. Wynne; and their evidence is encouraging. The result of the action of powerful oxidizing agents on certain forms of carbon is mellitic acid, $C_6(CO_2H)_6$, which is one of the benzene series; and this favours the view that solid carbon contains twelve, or some multiple of twelve, atoms in the molecule. It is further argued that the molecule of solid carbon consists of one or more carbon "rings." Finally, the President remarked that we must not lose sight of those relations of carbon and iron which involve physical equilibrium. Even the astonishing association of iron and carbonic oxide in the volatile gaseous compound with which the distinguished name of Mond is connected, affords a triumph of dynamic chemistry. On the whole, comparing the operation of rolling and finishing an armour plate with the best explanation that can be offered of the phenomena connected with the proceeding, the President hinted that practice is far ahead of theory.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 1682.)

BUSINESS on the Stock Exchange last week was much restricted. The predominant factor was, of course, the Transvaal difficulty; and, amid all the uncertainty and apprehension which it engendered, a policy of inaction seemed chiefly to recommend itself. In these circumstances, the powerful counter-attractions of sport at Ascot and Lord's were more easily yielded to; the result being a sparse attendance in Capel Court and small business. But at any rate prices were not as bad as they were the preceding week; Consols among the rest recovering nearly half their loss. The settlement was satisfactorily adjusted without complications. The Money Market continued in a condition of extreme ease, quite unmoved by Stock Exchange demands, and discount rates grew easier. Business in the Gas section was much below what one might call a fair average; and on no single day of the week was there anything resembling animation. The tendency, too, was decidedly flat, and a fair number of quotations have executed a retrograde movement; while the one or two apparent advances are barely the turn of the fraction on *ex*-div. alterations. Gaslight and Coke issues were naturally depressed; it being impossible to ignore the serious potentialities which may result from the parliamentary inquiry now proceeding. The ordinary opened weak at 112½, and drooped until on Friday it changed hands at 110; but the closing prices were a shade better. The maximum also lost a point; and the rest were not strong. South Metropolitan, which had for some time found difficulty in maintaining its ground, had a sharp fall, and on Friday it changed hands at 135. Commercials were quiet and steady. What few bargains were marked in Suburban and Provincials rather pointed towards strength; but quotations did not advance. The Continental Companies were as quiet as the rest; and Imperial receded a couple of points. The downward tendency extended to all parts; Bombay, Buenos Ayres, and River Plate being lower. Business in Water Companies Stocks was much about the same as usual; and the only changes were on *ex*-div. adjustments.

The daily operations were: Gas opened very quiet on Monday, and was rather disposed to greater ease. Imperial fell 1; and Bombay and Buenos Ayres ¼ each. Tuesday was just as quiet; and prices were as easy. In Gaslights, the ordinary and the maximum fell 1 each. Wednesday was about the slackest day of the week. South Metropolitan dropped 1. Thursday was not much brisker; and Imperial receded 1 and Buenos Ayres ¼. Friday was very flat. Gaslight ordinary fell 1, South Metropolitan 1½, and River Plate ¼. There was no pronounced rally on Saturday; and quotations closed unchanged.

ELECTRIC LIGHTING MEMORANDA.

Further Light Upon the Trouble of the City of London—The Corporation Suggest Terms—The New Electric Cabs—The Montauk Electrical Conductors.

THE story of the electric lighting troubles of the City of London is not complete without the commentary supplied by the "Citizen" of the 10th inst. We remarked a fortnight ago upon the strangely inconclusive nature of the report of the Streets Committee of the Court of Common Council, which broke off at the very interesting point where Sir Courtenay Boyle asked for the final views of the Corporation on the questions raised at the Board of Trade inquiry. We spoke in the "JOURNAL" for the 6th inst., of the "reserve" of the Streets Committee in respect of their answer to the inquiry of the Secretary of the Board of Trade, and at the same time remarked upon the mystery which surrounded the whole affair. According to the "Citizen," this indecision admits of an easy explanation, which is, that notwithstanding the gravity of the issue, at an important meeting of the Committee "the Chairman could not get a quorum of the Committee to stop and fully discuss the matter." Consequently, an imperfect report was all that could be presented to the special meeting of the Court of Common Council convened to receive this guidance; and the Court was fain to "make believe" that this was sufficient. The Board of Trade therefore dealt with the applications relative to the electric lighting of the City of London, without receiving the "views" of the Corporation at all! The following week there was another meeting of the Committee, as we have recorded; but it was then too late. The Directors of the City of London Company, who must have been acquainted with the heedlessness of the Corporation Committee, sent the reply we reproduced last week. The Committee at their belated meeting contented themselves with damning this capitulation as insufficient, and were perforce content to agree with the Board of Trade solution of the difficulty, subject to certain observations.

These observations are sound enough of their kind, and would have been entitled to greater respect if they had emanated from a local authority more capable of attending to important public business. The Streets Committee, meeting in desperate haste at the eleventh hour, agreed upon certain terms to be suggested for the consideration of the Board of Trade, as conditional for the admission into the City of the Charing Cross Company. These comprised the establishment of a separate generating station within two years—an artless proposal for facilitating the severance of the City portion of the undertaking. Next, the Corporation desired to be empowered to buy the undertaking after eight years, at a price to be made up as follows: (1) The cost of the undertaking; (2) an addition of 10 per cent.; and (3) back dividends up to 4 per cent. from the commencement, This reasonable (?) arrangement has to apply either to the whole or any part of the Company's property. When the terms were laid before Mr. Courtenay Boyle, it is not to be wondered at that he said nothing about the question of purchase, for or against. The Corporation having asked that the proposed Order should not prejudice their right to establish a competing undertaking, Sir Courtenay Boyle assured them that "so far as the Board of Trade are concerned, the Provisional Order could not possibly prejudice any right of the Corporation." As to other points, the Board of Trade preserved a diplomatic reticence. The Corporation were desperately anxious to "save their face" in these negotiations; but, as the Lord Mayor told the Common Council at the second meeting to consider the matter, "the position is that we have wasted a great deal of time to no purpose." The work will now be done without the help of the Corporation.

Mention has been made in these columns from time to time—not too respectfully—of the operations of the London Electric Cab Company. The vehicles of this enterprising Company are now on the road again, more or less; and it is claimed that the new pattern electric cabs exhibit some radical improvements. In the first place, the electric motors have been increased in power from 2½ to 3½ horse power, which is a very high compliment to that much-abused animal, the London four-wheel cab horse. Shade of James Leitch! whose too-faithful pencil immortalized this remarkable creature, with his driver, in many a laughter-moving sketch. What would the artist have said if he had been told that 3½ electrical horse power was the equivalent of the energy of this poor animal? The motors drive the cabs by means of a chain, as before; but the brake has been taken off the rubber tyre and applied to the band wheel. All the machinery is now carried on a tray with rubber stops and bearings; so that jarring is, as far as possible, prevented. It is hoped that the life of the rubber tyres will be greatly prolonged. Also, the action of the Company in generating their own current is expected to pay well in the long run. The claim of the Company is that by the new arrangement they get the current at the cost of 1d. per unit at the switchboard, as against 2¾d. per unit during the day, and 4d. per unit during the night, which they had to pay the London Electric Supply Company under the old arrangement. It remains to be seen how the Company will get on with the reformed conditions of working. This is their last chance. It may or may not turn out successful; but, meanwhile, it is to be observed that they do not attempt to compete with the good old London "growler" on its own ground. The London "fourwheeler" will take four passengers inside and one out, besides the driver; and will carry on the roof an inconceivable pile of luggage. So loaded, it will bowl from Waterloo to Liverpool Street, from Charing Cross to St. Pancras, at a respectable rate of speed. The vaunted electric cab is constructed to carry two passengers, besides the driver; and the people inside do not look supremely happy as a rule.

An interesting device, called the Montauk Multiphase Cable, utililizes one of the familiar defects of electric wiring—the liability to develop "short-circuits" as the result of accidental injury. Many fires have been caused by this weakness of the ordinary insulated conductor. In the Montauk cable, this effect of short-circuiting is actually arranged for and invited in the event of anything being amiss in the place where the conductor is placed—as for instance, a fire, or the act of maliciously cutting through the wire. There are in the cable two conductors of copper, separated by a fusible packing, and when the heat of a short-circuit due to a mechanical injury, or the outside heat of a fire, melts this packing an alarm is instantly given. Every part of the wiring is therefore a fire alarm; and accordingly warehouses, coal-bunkers, and other places wired on this system are claimed to be more efficiently protected than by any number of isolated thermostats. By connecting the wiring with a telephone system, the Fire Brigade, or Police, could be automatically called up, day or night. This conversion of a defect into a virtue, in the case of electric conductors, is very striking.

A Correction.—Mr. Charles Hunt asks us to state that, in the discussion on Mr. Foulis's paper at the conference of the Institution of Civil Engineers, he inadvertently referred to Wigan instead of Widnes.

Iron and Steel Institute.—The local arrangements in connection with the forthcoming visit of the Iron and Steel Institute to Manchester are now well advanced. The proceedings will be opened on the 15th of August, when a meeting will be held in the Town Hall, and on the same day visits will be paid (among other places) to the Simon-Carvès coke-ovens at the Barrow Steel Company's Collieries, and the Wharncliffe Silkstone Collieries, near Barnsley.

THE RENASCENCE OF HIGH-POWER GAS LIGHTING.

It is evident that recent improvements in the application of gas to high-power lighting, altogether apart from the choice of the apparatus required for the purpose, will have the immediate effect of re-opening the question of the best means of lighting important streets and open spaces. If the friends of the gas industry do their duty in connection with this revival of interest in so important a branch of the public service, it appears more than probable that the example of Berlin will be largely followed, and the expensive and disappointing electric arc lamps be relegated to a lower sphere of utility, as for shop advertising purposes, and so forth. Up to the present time, there has been a certain attractiveness in the idea of streets being lighted by electric lamps of 2000 or 1200 candle power (nominal); and the attempt to rival such powerful light-centres by gas has been long since abandoned. The pioneer work of Siemens, Sugg, and Bray in this field is not to be forgotten; but it is nevertheless the truth that until the recent revival of intensive gas lighting by incandescent burners, the electric arc lamp was in sole possession of the ground. It is scarcely an exaggeration to say that the arc lamp has kept the place warm for the new gas-lamps. For notwithstanding the improvement in the construction of the arc lamps themselves and the perfection that experience has brought to the routine of the service, the fact remains that the cost of this lighting remains the same as it was in the early days, while the drawbacks of glare, flickering, noise, and unreliability are scarcely touched.

It is worth while to take a glance back over the course of street lighting development, as it has been moulded and to some extent directed by the enterprise of the electricians. A useful text for such an exercise is supplied in a paper read by Mr. Albert Sheible before the Chicago Electrical Association. When electric lighting on the commercial scale came into being, as Mr. Sheible remarks, it found public street lighting firmly established upon the two prime requirements of "path finding and crime preventing." This is a happy way of putting it. Highway lighting authorities "wanted to give the pedestrian enough light to see others approaching him, and to avoid his stumbling over irregularities in the side-walks or steeets. They endeavoured to give enough light at the crossings for teamsters to see holes or obstructions in the roadway; and they knew that the highwaymen would be greatly handicapped by the lighting of the dark nooks and alleys which formerly harboured them." It is worthy of being remembered that, while recognizing the expediency of providing public street lights, the local authorities of the days before electric lamps had a frugal mind as regards the expense, and public lighting was only studied with the object of seeing how cheaply it could be done.

As Mr. Sheible well remarks, when first the Jablochkoff "candle" of Europe and the Brush arc lamp of America burst upon a literally dazzled public, the previously well-known objects of street-lighting were forgotton. "Wherever the arc lamp or the Jablochkoff candle was shown, the high candle power made the old gas or naphtha lamps seem very dim and ineffective; hence the cry went up immediately for electric street-lamps, powerful street-lamps, dazzling street-lamps." Mr. Brush still tells the tale of the first display of public electric lighting in America, when a dozen "tower lamps" were put upon the public square at Cleveland, and the gaping spectators came in crowds, not to see illumination, but to be dazzled—to see the glare. It was not lighting, it was a show of lights; and, as Mr. Sheible admits, this new, spectacular aspect of it has clung to street lighting by electricity ever since. Never mind if the new system of lights was twice or thrice as expensive as the old serviceable lighting which looked so dim and poor beside it. Money might be saved by spacing the arc lamps far apart, and sacrificing all useful effect for the sake of an infrequent glare. Still, the town had the glare and the renown of being provided with electric light; and this was worth having at the cost of a large outlay and some inconvenience. In the United States, at any rate, trade seems to have been drawn to business quarters which could boast of a blaze of electric street lights; and consequently anything was endured for the sake of the broad result.

The author does not say much about the early vagaries of electricians new to the work of public lighting, in the desperate attempt to strike out new lines of practice. The ridiculous lighting towers and the mammoth arc lamps of the early "eighties," would gladly be left in oblivion by electrical apologists; but gas engineers are not likely to forget them as illustrations of the folly of clever technicians and well-meaning local authorities. Mr. Sheible confesses that the common arc lamps of the period were very rough and crude productions. Almost anything would do that would show the much-admired electric light; and even now the number of manufacturers of really good and suitable street lamps, standards, and fittings is stated to be (in America) "very, very small." This reproach does not apply to the British and European trade in these articles. The closer the practice of street arc lighting has approached that of rational gas lighting, the better have the electrical appliances become, until they are now often a pattern for any method of lighting.

Mr. Sheible recognizes the fact that the so-called 2000-candle power (460 watt) and 1200-candle power (300 watt) arc lamps have proved the fittest to survive the long stress and strain of competition; but he thinks that smaller lamps will be more used in the future. This would probably be the case, if reliable small arc lamps could be had. As a matter of experience, the two standard sizes of arc lamps named appear to be alone worth making and using, when everything is taken into consideration. The author deals very gently with one of the chief inducements to the use of these lamps in the early days—the impudent imposition of "French measurement" of candle power, which was a far more profitable invention than the actual lighting apparatus. "The term 2000-candle power in itself impressed the towns lighted as something worth having; and if they happened to find out that the lamps really gave only about a quarter of this candle power, the electric light men had no difficulty in convincing them that 'the 2000-candle power lamp is one which sends 500 candle power in each of four directions from its place over the street crossings.'" The custom of rating arc lamps at these nominal illuminating powers is far from having lapsed. There is not an electric lighting tout who does not use it to this day for the obfuscation of local authorities. An enormous amount of work has been done upon the arc lamp and the machinery for working it since the early days; but much remains to be done before central station managers will feel quite happy in running their arcs and incandescents from the same machine. It is the station management which the realized and prospective improvement of dynamos, switches, and lamps mostly interests. The concern of the public in the actual lighting performance of any street illumination system is of a different character.

As regards the disposition of street lamps, we are glad to recognize that the "show" element, first introduced by the electric arc lamps, remains as a permanent consideration. It has ceased to assert itself so overpoweringly as it naturally did at first, when people stared at the new lights and wondered at their brilliancy. It now operates as an inducement to make all public street lamps and lighting ornamental as well as useful; which was not thought of when the saving of gas was the sole concern of highway authorities. The partisans of gas have no reason to complain of this new requirement being put upon them as upon electricians. Equal treatment all round is all that need be desired or expected; but it is only lately that the influence of "vogue" ceased to operate exclusively in favour of electric lighting. Now the intensified gaslight is a greater novelty than the arc; and to this extent the tables are turned. Meanwhile the inconveniences of arc lighting have amply declared themselves.

Impossible as "tower" lights proved to be under the ordinary conditions of street lighting, with houses of different heights and sometimes shade trees to interfere with the rays of the clustered lamps, the idea yet represented the only suitable arrangement for rendering available the overpowering brilliance of the unshaded electric arc. So it is still found the best disposition for lighting railway goods yards and open spaces of a certain class. For thoroughfares, however, it was soon discovered that the lamps must not be more than 25 feet above the road level, and this entailed the use of opal or faceted globes and lanterns. At one time, cross suspension of street lamps was much favoured by electricians; but this expedient has not survived experience of the effect of storms. A reasonable amount of steadiness of fixture is now perceived to be essential in a street lamp. Even electricians learn wisdom through suffering. Besides, cross suspension is more costly than lamp-posts. As Mr. Sheible tersely puts the fruit of experience in another respect: "Yesterday the cry was for large lamps and intensely bright illumination of some picked spots, regardless of the equally intense shadows intervening; to-day there is the tendency to have the rays of light overlap, and to use lower candle-power lamps in the alley-ways and other dark nooks and on the streets of the outlying districts; to-morrow we may look for smaller units and a great many more of them." And when to-morrow comes, it will be the fault of gas engineers if they remain out of this programme. Electricians, says this candid witness, are "getting back to due consideration of the prime objects of all street lighting—path finding and crime preventing." But they will not find themselves singular in this return to common sense. Except in some places where electric steet lighting has been municipalized, and the £30 arc lamp is kept up at the expense of the ratepayers, in order that the electric lighting department may make a better showing as a corporation asset, the return of reasonable views of the requirements of public lighting will find gas in a very different position from that to which it had been reduced by the old "average meter system" and other cheeseparing devices of a past epoch.

For the present, the care of the friends of gas must be to provide abundant illustration of the change that has supervened since the old street governor burner represented all that was deemed necessary for this service. Where the facts are allowed to speak for themselves, by legitimate advertisement, advocacy is superfluous. Favour and fashion have helped the electricians so far; but they have failed to improve the occasion. Unless appearances lie, the "2000-candle power arc lamp" has seen the best of its vogue. But it has made its mark on the public mind; and, thanks to it, the old order of street lighting which was "no light, but rather darkness visible," has passed away for ever. Let it not be forgotten that in this impending renascence of public gas lighting, much will turn upon the selection of the lamp-columns or wall brackets. In many towns the old ones ought to be sent to the scrap heap without compunction. As we have

often pleaded, a valuable amount of public interest in matters of this kind might be created by the offer of prizes for acceptable designs by local talent.

WORKMEN'S BENEFIT SOCIETIES.

An Answer to Some Criticisms.

We have received from the Hon. Sydney Holland, the Chairman of the East and West India Dock Company, some comments on the articles which have recently appeared in these columns dealing with the report of the Committee on Shop Clubs. The comments are in the form of marginal notes to the articles, and cannot therefore be intelligibly reproduced without the subject-matter to which they refer. But as Mr. Holland thinks we have not fully understood—or fairly represented—the action of his Directors (upon which we adversely, but not harshly, commented), we purpose, in fairness to him and in justice to ourselves, to give the substance of his remarks, and, if possible, to answer his arguments. We have also received from Mr. Holland a pamphlet published by him last year in defence of the now famous rule of the Dock Friendly Society, which led to the appointment of the Home Office Committee, and against which the aforesaid criticism was directed.

As Mr. Holland says in his preface to the pamphlet, "the matter is one which can be looked upon from different points of view;" and we cannot but think that, with the best intention of being impartial, Mr. Holland finds it difficult to stand at any other point than his own. He entirely fails to realize our reasons for holding that the rule in question—prohibiting membership of outside Societies—does unfairly prejudice the interests of the dock employees. We contend that this rule would, under certain possible circumstances, prove to be contrary to the interests of such men as might remain in the service of the docks all their lives; while it will assuredly injure the position of men desiring, or being obliged, at the end of a considerable term of employment, to quit the service. Our point with reference to the first of these contentions is that, even if there were no other objection to the rule, its non-harmfulness depends upon the continuance of the policy of the present Board of paying half-wages to their men in sickness; that for this continuance there is, and can be, no effective guarantee—the minutes of a Board of Directors are not graven in the everlasting rock—and that, if the present or a future directorate of the docks were to discontinue this policy, many of their men would then be unable, through advanced age, to substitute for that half-pay (except on unfavourable terms) membership of an outside Society. Further, by being prevented joining any other Society, none of the dock hands can by such means insure "out-of-work" allowance if on strike.

In support of the second of these contentions, our argument is that if, after (say) twenty years' service at the docks a man should wish to leave, he would probably be deterred from so doing by the consideration that, although he could still remain a member of the Dock Society, he would find it difficult to obtain another situation where half-pay was allowed during sickness, and could only effect insurance thereof with a Friendly Society at a much higher rate than if he had been allowed to do so early in life. The men are therefore, we hold, unduly bound to their employers. Mr. Holland denies this, but advances no proof in support of his denial beyond stating that, even if free to do so, the men would not ensure the maintenance of a reasonable income during disablement (we did not say an insurance of full wages, though that is frequently done), for he says: "No men now insure themselves in Friendly Societies for their whole wage. If you inquire, you will find that this is so. I meet lots of them in my hospital work; and the sick insurance is never more than half the full pay." We reply that we do not need to inquire. We know of our own experience that Mr. Holland is wrong; and, with all due deference to Mr. Holland's East-end experience (we referred in our first article to his valuable philanthropic work there), we have to say that, since the class of labourers with whom Mr. Holland has chiefly to deal is by no means the highest, inferences drawn from experience there among cannot be applied to the whole sphere of industrial economics. But even with reference to his own particular men, Mr. Holland's comment can be answered out of his own mouth.

The reason given for prohibiting men from joining any outside Society is stated in Mr. Holland's pamphlet to be this—that "if the men were allowed to insure in other Societies as well as in the Dock Friendly Society, they would be receiving more pay when ill than when well. For example: A man in the Dock Committee's employ, and receiving 28s. a week wages, is allowed to insure in the Dock Friendly Society so as to receive 14s. a week in sickness; and he gets from the Dock Company the other half of his usual weekly wages. But if he were allowed to belong to another Friendly Society—say the Hearts of Oak—he would receive a further allowance of 18s. a week from the Society, or, in the aggregate, 46s. a week when absent ill, as against 28s. when at work." This argument, it will be seen, affirms, what Mr. Holland now denies, that, unless prevented by special rule, some of his men would be certain to join another Society in addition to that connected with the docks, and receive from the two Societies (excluding any question of half-pay from the Dock Committee) a total of 32s. a week when ill as against 28s. when well—a sick insurance of more than their whole wage. We do not need to inquire of any other authority than that of Mr. Holland for an answer to his criticism.

As to our conclusion that "the Dock Authorities would be well advised—if the suggestions of the Committee are adopted by Parliament they will, indeed, be compelled—to rescind the rule prohibiting members of their Society from belonging to any other," Mr. Holland says: "If you will read the evidence (Answers 163 and 164), you will see that we are willing, but are unable. It is the men alone who can do so, and by a vote of 886 (*sic*) to 4 they refused to alter. So your criticism is unfair." We certainly did not draw our conclusions without reading the evidence. But, as requested, we turn again to Answers 163, 4, and 5, and what do we find? "We will give the men either half-pay and our Club alone; or *no half-pay*, our Club, and as many Societies as they like.—That has been put clearly before the men? Yes; only 4 out of 868 men voted for the abolition of this rule compelling men to leave other Friendly Societies on joining the Dock Friendly Society." Our surprise is that, considering the bribe offered, four Dock labourers were found sufficiently far-sighted to prefer future liberty of action to such apparent present gain; and to see that that present gain might easily end in eventual loss. We decline to attach any value to such a vote as an indication of the opinion of the general body of the men on the rule.

Let Mr. Holland ballot his men on the following question: Which would you prefer the Dock Committee to do—to continue to grant you half-pay in sickness on the existing condition that you renounce the right to belong to any other Society, or substitute for that grant a contribution to the funds of your Society equal to the average annual amount they now pay in wages to sick men—such alteration to be followed by an amendment of your rules providing for an equivalent reduction of your weekly contributions to your Society, with freedom to devote such saving to subscribing to any outside Society, and providing that should you leave the employment of the Committee your contribution shall be raised to the amount you now pay? We venture to think that the ballot-box would tell a rather different story then; and if, as Mr. Holland repeatedly protests, and we have no reason to doubt, the Dock Directors do not wish to unduly bind their men to their service, but only to deal fairly with them, they must either make some such alteration in their policy or give some better reason for not doing so than has as yet been advanced.

Mr. Holland further disputes our accuracy in saying that "if the suggestions of the Committee are adopted by Parliament, they will be compelled to rescind the rule" in question. He says: "Not at all, because our Club conforms to all the 'Proviso,' *i.e.*—the Society is registered, certified, and is in conformity with Private Act." We must point out, first, that if the Docks Friendly Society is established by Private Act, the Departmental Committee were not informed of that fact, and, by implication, assert the contrary; for in paragraph 11 of their report, they say: "There are in addition a number of Shop Clubs in connection with Railway and other Companies established or supported under statutory powers given to such Companies by their Private Acts of Parliament. . . . All these . . . are considered by the Committee to be outside the scope of the present inquiry."

In the second place, if Mr. Holland will re-read the report, he will find that, the suggested law not having yet been placed on the Statute Book, the Registrar can hardly have already certified the Dock Society to be one to which a provision of such law should not apply; and, further, that it is only in regard to the first of the suggested provisions—viz., "That it shall not be lawful for any employer to make it a condition of employment that any workman shall join a Shop Club"—that the Committee recommend that any exemptions shall be made. The proposed enactment "That it shall not be lawful for any employer to make it a condition of employment that any workman shall discontinue his membership of any Friendly Society to which he belongs, or shall not become a member of any other Friendly Society," is not qualified by any provisions or exemptions.

Mr. Holland says that we have "missed one point—and an important one." We think we have shown that several points have been missed—but not by us.

The Nation's Finances.—A very lucid and impartial survey of the policies pursued by the several Chancellors of the Exchequer during the past quarter-of-a-century, and of the effect of those policies upon the national finances and upon the individuals comprising the nation, is given by Mr. Joseph Ackland in the current number of the "Fortnightly Review," in an article entitled "Twenty-five Years' Financial Policy." Mr. Ackland tells us the revenue (excluding the Post Office) has risen from £68,521,915 in 1874-5 to £105,747,353 in 1898-9—an increase of upwards of 54 per cent.; that, while the contribution of Customs and Excise has fallen from about 74 to nearly 56 per cent. of the tax revenue, the contribution of income and property taxes has risen from 26 to 44 per cent.; and that the income-tax has advanced from 2d. to 8d. in the pound. The writer's conclusion is that, "whether we look at the growth of expenditure, the incidence of the burden, or the methods of procedure, all alike cry aloud for return to the old Liberal watchwords—Peace, Retrenchment, and Reform."

OBITUARY.

When recording in the "JOURNAL" last week the death of Mr. FRANCIS BASSETT, it should have been mentioned that his connection with the gas industry was not confined to his directorship of the Imperial Continental Gas Association, as he was also Chairman of the Leighton Buzzard Gas Company.

A melancholy interest attaches to the article which appeared in the "JOURNAL" last Tuesday, dealing with a lecture by Dr. LAWSON TAIT on "The Uses of Gas for Fuel," as on the afternoon of that day the eminent Birmingham surgeon died at his residence at Llandudno, whither he had removed about three years ago, on relinquishing a portion of his practice in the Midland capital. Deceased was a specialist in abdominal surgery; having brought into existence a large number of new operations, and perfected many others. He held the degrees of F.R.C.S.Eng. (1871), F.R C.S.Edin. (1870), Hon. M.D. of New York and Albany (1886) and of St. Louis (1889), and Hon. LL.D. of the Union University, New York (1888). His publications, particularly those dealing with his special subjects, are numerous. Notwithstanding the many claims made upon his time by his professional duties, he devoted himself to municipal life in Birmingham, and was a member of the Town Council from 1875 to 1885; being actively engaged in the important municipal and sanitary improvements inaugurated by Mr. Joseph Chamberlain. He became a member of the Health Committee in 1877, and held the chairmanship in 1884-5. He had been in indifferent health just before his death; and he was taken so seriously ill on Monday last week that two medical men were summoned from London to see him. They found him rather better; but he had a relapse later in the day, and died suddenly in his 55th year.

PERSONAL.

The Maldon Town Council have appointed Mr. G. W. BROOKS, of Maldon, to be Superintendent and Manager of their water-works.

Mr. JAMES KAY, who has been Assistant Gas and Water Manager at Elgin, has been appointed by the Town Council to the post of Manager, in succession to Mr. W. Taylor. Mr. Kay was not originally on the short leet, but was placed upon it after the first of the three in that list had been interviewed. The election was by nine votes to eight.

At the recent meeting of the Tonbridge Water Company, the Chairman, Mr. JOHN FAGG, was presented by the share holders with two easy-chairs, as a general mark of their esteem and regard, on his completion of twenty-five years' service as a Director. His colleagues on the Board had previously presented Mr. Fagg with his portrait, and it was on view on the occasion.

The salary of Mr. HENRY PEATY, the Engineer and Manager of the Burslem Gas-Works, has been increased by £100 per annum. Since the previous change in his remuneration, the make of gas has risen from 125 to 177 million cubic feet; and at the Council meeting at which the present advance was unanimously granted, highly complimentary references were made to Mr. Peaty's ability as a Manager.

Mr. ALFRED J. JENKINS, the Assistant Water Engineer of the Cardiff Corporation, has been presented by the officials of the department with a number of useful books, on his resignation to take the position of Deputy Borough Engineer and Surveyor at Burton-on-Trent. Mr. C. H. Priestley, the Engineer, in making the presentation, spoke in very high praise of Mr. Jenkins's abilities, and wished him, on behalf of the staff, every success in his future career.

We are sorry to learn that Mr. FLETCHER W. STEVENSON, M.Inst.C.E., the Engineer of the Sheffield United Gas Company, has sent in his resignation; and, as will be seen from the announcement which appears elsewhere, the Directors are inviting applications for the position. Mr. Stevenson has held for just over eleven years the appointment he is about to relinquish; having in May, 1888, succeeded Mr. J. T. Key, whose predecessors were Messrs. Romans, Young, and Unwin. Before going to Sheffield, Mr. Stevenson was Engineer and Manager of the Chester United Gas Company. We learn that Mr. Stevenson has decided to commence practice in Westminster as a Consulting Engineer.

Evening Star Lodge.—In accordance with the custom obtaining during recent years when The Gas Institute have met in London, the Evening Star Lodge of Freemasons arranged to hold last week an Emergency Meeting, so as to allow an opportunity for the interchange of friendly greetings between the members of the Lodge and brethren from the Provinces. The meeting was on Monday, at the Holborn Restaurant, and the company present numbered more than 120 in all. The W.M. (Bro. Thomas E. Priestman) was in the chair, and initiated Mr. Samuel Wood (of the firm of Messrs. Alfred Lass, Wood, and Co.), the Secretary of the Georgetown Gas Company. After the banquet at the close of the proceedings, there was a vocal and instrumental concert, which formed a welcome change from the usual long string of Masonic toasts which ordinarily form so dull an ending to functions of this kind.

TECHNICAL RECORD.

THE AUTUMN MEETING OF THE INSTITUTION OF GAS ENGINEERS.

Suggested Programme.

We are asked by Mr. F. D. Marshall, the President of the Institution of Gas Engineers, to publish the following outline programme of arrangements in connection with the proposed visit of the Institution to Copenhagen in the autumn:—

Friday, Sept. 8.—Leave London (Victoria) at 8.50 p.m., and proceed, *viâ* Queenborough and Flushing, to Hanover and Berlin, arriving 7.30 p.m. on Saturday.

Sunday, Sept. 10.—Drive round Berlin, visiting the parks and principal thoroughfares.

Monday, Sept. 11.—Visit the Gitschinerstrasse, Möllerstrasse, and Charlottenburg Gas-Works; also (time permitting) the Löwe Small-Arms Factory and the Siemens-Halske Electrical Works.

Tuesday, Sept. 12.—Leave Berlin at 8.30 a.m. by the Stettiner-Banhoff restaurant train for Copenhagen, *viâ* Warnemunde and Gjedser; reaching Copenhagen at 7.30 same evening.

Wednesday, Sept. 13.—Visit the Frederiksberg works of the Danish Gas Company, the Danish Coal Company's coal-storing installation, the Free Harbour and Docks, and the Temporley Coal Conveyor.

Thursday, Sept. 14.—Visit the Eastern Gas-Works of the Municipality; also Elsinore and Hamlet's grave.

Friday and Saturday, Sept. 15 *and* 16.—Visit objects of interest in Copenhagen and its vicinity, Thorvaldsen's Museum, Rosenborg, &c.

Sunday, Sept. 17.—In Copenhagen (beautiful English Church).

Monday, Sept. 18.—Leave Copenhagen at midday, *viâ* Kiel, for Hamburg, arriving same evening at 9 o'clock.

Tuesday, Sept. 19.—Visit the Gas-Works, Docks, and Possehl's Coal-Storing Installation.

Wednesday, Sept. 20.—Visit the city and its environs.

Thursday, Sept. 21.—Leave Hamburg at 2.50 p.m. for London, *viâ* Osnabrück and Flushing, arriving in London at 8.30 on Friday morning, Sept. 22.

In regard to the travelling arrangements, the Queenborough Flushing steamers are excellent; and there is a good restaurant train between Flushing and Berlin. The hotels in Berlin are the Central, Monopole, Continental, Palace, Savoy, Du Nord, Bristol, and Westminster. The Central is the most reasonable in price. The others are excellent first-class hotels, especially the Bristol, but a little more expensive. Single rooms average from 5 to 7 marks a day; breakfast, 2 marks. The Copenhagen hotels are the Angleterre, Phœnix, King of Denmark, Dagmar, Frederick VII., Monopole, and Métropole. All are good, and the charges very reasonable—5s. to 7s. a day for a single room; breakfast, 2s. The principal Hamburg hotels are the Hamburger Hof, Kronprinzen, Europe, and Streit's. All are good and reasonable.

To those who intend visiting Copenhagen, the Danish Tourist Society will be pleased to forward a copy of their interesting guide to the city. Every effort will be made to reduce the daily expenses to a minimum; and the visitor may count on considerable hospitality. No travelling agent will be employed; but Mr. Marshall and his assistants will be quite at the service of visitors. Further details will be published as soon as the number of the party is definitely ascertained. September is a beautiful month, as a rule, in Scandinavia, and everything will be done to make the trip enjoyable. Mr. Marshall will be glad to answer personally any inquiries respecting the visit.

THE CONFERENCE OF THE INSTITUTION OF CIVIL ENGINEERS.

The Water Papers in Section VI.

We complete to-day our report of the proceedings in Section VI. at the recent conference of the Institution of Civil Engineers by giving, in abridged form, the papers and discussions on the water subjects considered at the first sitting. Mr. GEORGE H. HILL presided.

Mr. M. W. HERVEY (West Middlesex Water Company) read a paper on

THE USE OF FILTERED FLOOD-WATER.

The use of flood-water, remarked the author, is a subject on which opinion has very much changed within the last few years. Within quite recent years it was considered most undesirable to take water from a river when in flood for at least ten days or a fortnight after the flood; but now many experts are of opinion that flood-water may be taken without restriction provided that it is afterwards subjected to subsidence and efficient filtration. Obviously any restriction must very much reduce the number of days in the year on which water may be taken from a river, and thereby largely increases the cost of providing storage. In the

author's opinion, it may safely be left in the hands of the engineer to use his discretion as to when to reject flood-water. It is always to his interest to take the best water, thereby saving expense in cleaning filters. For a town dependent on its water supply from a river the water of which has to be filtered, it is doubtless desirable, if possible, to allow the first flush of flood-water to pass before taking it into subsidence reservoirs; but it is not absolutely necessary. One flood may be followed comparatively quickly by another (the effect of the first flood having been to cleanse the watershed); and the water of the second is therefore in comparatively good condition.

Subsidence in large reservoirs has a very powerful effect in purifying the water; and efficient filtration completes the process. The result of heavy rains, causing a river to be in flood, is to wash the vegetable and organic matter accumulated on the watershed into the river, and microbes with it; and thereby the microbes in the water are enormously increased. But by reason of the large volume of water passing down the river, the impurities in the water are in a very diluted condition. The water also carries a certain quantity of clayey matter in suspension. If flood-water is passed into a subsidence reservoir of large capacity, the slow velocity at which it runs from one end of the reservoir to the other—there to be drawn off on to the filters—enables the matter in suspension, which in the worst of Thames flood-water varies from only 1 grain to 1½ grains per gallon, to subside. As it settles, it carries down the microbes with it. Sunlight also has a very deleterious effect on microbes, and kills them. Thus flood-water that contains thousands of microbes per cubic centimetre when taken into a large subsidence reservoir, contains only hundreds per cubic centimetre when drawn off at the opposite end. Flood-water is a good deal coloured, due principally to vegetable matter. Sunlight has a powerful effect in bleaching the colour; but it is a difficult matter to get rid of the colour entirely. It is, however, perfectly harmless, and the objection to it sentimental.

The process of filtration of water requires the greatest amount of care; and its efficiency depends on several conditions—viz., thickness of sand, degrees of fineness of the sand, and rate of filtration. With these conditions fulfilled, and if a sufficient number of filters are provided, an excellent filtrate can be obtained, practically pure from microbes (that is, under 100 per cubic centimetre), even from flood-water passed direct on to a filter. Obviously, however, the filter becomes choked more quickly, and entails the expense of cleaning more frequently. As an instance of passing flood-water direct on to the filters, Sir William Crookes, in giving evidence before the Royal Commission, presided over by Lord Llandaff, stated: "The large rainfall which took place in October last had the effect of suddenly washing into the rivers organic matter accumulated on the watershed during the three previous months; and as the reservoirs of the East London Water Company were almost empty at the end of September, the Company were forced in October to use the Lea without the advantage of the purification resulting from proper storage in the reservoir. During this critical time, we took extra pains to ascertain the character of the East London supply; and additional samples were regularly taken from various points in the district. It is highly satisfactory to report that, in spite of the severe strain thus thrown on their filtering appliances, the clear water supply of East London has been bacteriologically better than it was during the months of August and September." This is very instructive, as showing that flood-water can be dealt with efficiently when passed direct on to a filter.

The analysis of a sample of water taken by Sir Edward Frankland on behalf of the Local Government Board from the mains of the East London Company on Oct. 25, 1898, gives an equally good result chemically: Organic carbon (expressed in parts per 100,000) 0·107, organic nitrogen 0·008. The average of four samples taken on Oct. 1, 10, 18, and 26, by Sir William Crookes and Professor Dewar from the mains of the Company gave: Organic carbon 0·072, organic nitrogen 0·013. During the same month a mean of 26 samples taken from the River Lea (unfiltered) contained 1719 microbes per cubic centimetre, and a mean of 26 samples of the Lea water taken from the clear water well of the Company contained only 13 microbes per cubic centimetre.

Returning to the conditions to be observed to effect efficient filtration, the author said the thickness of sand necessary is to a certain extent governed by its degree of fineness; and this is obtained by the greater or less admixture of sea-sand with the sand screened from the ballast of the district. Among the several London Water Companies, the thickness of sand on a filter varies from 4 ft. 6 in. to 2 feet. The rate of filtration also varies among the several Companies—viz., from 1¼ to 2¼ gallons per square foot per hour. The rate fixed by the late Colonel Bolton as a safe rate of filtration was 2½ gallons per square foot per hour; and this rate is acquiesced in by the present Water Examiner, General A. de Courcy Scott. The longer a filter can be kept at work without requiring to clean the surface, the better, because shortly after it is set to work a gelatinous film is formed on the surface, by reason of the microbes arrested; and this film is of very great importance in producing a thoroughly good filtrate. The process of cleaning the surface obviously removes this film, which has to form again when the filter is set to work.

To show the efficiency of filtration in removing microbes during the year 1898, taking the mean of the average for each of the twelve months, the number of microbes per cubic centimetre was as follows: Unfiltered Thames water 4672·0, filtered 34·8; unfiltered Lea water 2540·0, filtered 25·8.

The author reproduced a table from a statement placed before the Royal Commission of 1892, by Sir William Crookes, showing the effect of flood-water on the chemical composition of the water supplied by the five London Companies deriving their supply from the Thames. Sir William stated that "the differences are utterly insignificant; and they show that in effect the flood-water is not less pure than the ordinary flow of the river water." In conclusion the author offered it as his opinion that, with proper subsidence and efficient filtration, flood-water may be taken without restriction, and be delivered to the consumer in thoroughly good condition, both chemically and bacteriologically. In all the bacteriological examinations made by the experts engaged in this matter, a pathogenic germ has never been discovered in the water supplied by the London Companies.

Discussion.

Mr. E. M. EATON said that in the North of England where the water supply was derived from large storage reservoirs controlling gathering-grounds, they had to take the water in just as it ran off the surface of the ground. There were in some waterworks means for sorting the flood waters; but if they had to fully realize the yield of the drainage area, they must take the whole of the flood coming off during certain seasons. He had found, from an experience of thirty years, that, when they got flood waters off upland gathering-grounds, they had two conditions to deal with: First, organic matter in the form of peat, giving rise to a very strong peaty stain; and, secondly, suspended clay and sandy matter. He had found that while the peaty water by itself would retain its stain for a great length of time, if it entered the reservoirs with fine clay and sandy elements, this exercised a most extraordinary effect in precipitating the peaty matter, and in purifying the water. He had noticed this over and over again so many times that he had come to the conclusion that, in these latter days, they were straining rather too much after the critical purity of water. He had arrived at the opinion that water was really better if it was not quite so pure as the chemist tried to make it. Physiologically they knew it certainly was so. If they did too much to the water, they took out a certain amount of organic matter which was necessary to the human frame. Referring to the Thames water, they found a great difference existed now compared with the operations that took place 20 or 25 years ago. Then the volume of space in the subsiding reservoirs was much less than it was to-day. There was a growing tendency—and very properly so—to increase the amount of storage capacity in the subsiding reservoirs. In the old days, when practically they drew the water out of the river direct on to the filter-beds, it was necessary perhaps to avoid taking the first rush of the flood—not on the score of the public health, or the purity of the water, but because it choked the fine pores of the filters, necessitating an increased head to get the water through, with the result that they did not get the careful and slow filtration which it was sought to obtain in these days. Under modern conditions, the subsiding reservoirs received the water; and it was not necessary to take it in its raw state on to the filter-beds, and therefore they had the opportunity of depositing the mechanically suspended particles contained in the water. This process, while depositing the sand and clay, took down also the organic matter; and an enormous improvement was found in the quality of the water. When Mr. Hawksley and himself looked into this matter of the Thames supply for the purpose of sustaining the position assumed by Messrs. Middleton and Hunter and the Engineers of the London Water Companies before Lord Landaff's Commission, they thought it well to have many careful discussions with Professor Dewar and Sir William Crookes; and they confirmed, by chemical analyses, the conclusions Mr. Hawksley and himself had derived from engineering experience in other places. They were all of one mind, and he put it now publicly (he had not the opportunity of doing so to the extent he should have liked to have done before Lord Landaff's Commission), that there was no necessity to pass one single day's flood from the subsiding reservoirs of the London Water Companies. The Thames, even in its worst state, contained water of a character that, by precipitation and the natural process of purification which went on in the subsiding reservoirs, was of the highest class and quality for domestic purposes.

Mr. G. F. DEACON observed that the remarks of the last speaker as to the possibility of clarifying flood waters were no doubt perfectly true; but they should be careful not to allow it to blind their eyes to the undoubted fact that they had not yet, by any process of filtration, or even of subsiding reservoirs, succeeded in assuring themselves that the pathogenic germs were entirely arrested. He did not think it made much difference whether the pathogenic germs came from flood waters or from waters that were merely the result of freshets. It was, however, an undoubted fact that, in the case of freshets after a prolonged drought, the proportion of bacteria was as high as, or higher than, in the case of floods. He did not himself think there was much in this question of the exclusion of flood waters if the storage was abundant; but it did not touch the point as to the passage or non-passage of bacteria.

Dr. A. W. BRIGHTMORE said the author of the paper had pointed out that the efficiency of filtration depended on the formation of the "gelatinous film" on the surface of the sand.

To get this film formed, it was desirable to design the filter so that the percolation all over its area would be as uniform as possible. The rate of percolation at any point of the filter depended on (1) the resistance of the sand, and (2) the resistance offered by the collecting-drains between that point and the outlet. The resistance of the sand was constant all over the filter, and that of the collecting-drains varied with the distance of the point from the outlet. Consequently, the greater the resistance of the sand, and the smaller the resistance of the collecting drains, the more uniform would be the percolation to start with—that was to say, the finer the sand, and the greater its thickness, and the larger the collecting-drains, the more uniform would be the percolation through the filter. However, it was not necessary to carry this to an extreme, because, if the percolation was sufficiently uniform for the film to form over the filter, it would become thicker where more water passed through than where the percolation was less; thus rendering the percolation through the filter uniform. He suggested that the resistance of the sand was its chief property for filtration purposes.

Mr. Walter Hunter (Grand Junction Water Company) said the author was a master in the art of delivering good water to London. He had very wisely constructed large subsiding reservoirs at Barnes; and by this means, and by the fineness of the sand used in the filters, he was able to send out water more uniformly good than any other Company in London. They were all beginning to get more nearly up to his standard; and he (the speaker) was glad to say that his own Company had certainly very largely improved their supply, looked at both chemically and bacterially, during the last two or three years. They had been spending a large amount of money in filtering plant; and so far a good result seemed to have been obtained. They were not in Mr. Hervey's happy position of having large subsiding reservoirs; and therefore they threw more work on the filters. No doubt the absence of these subsiding reservoirs rendered it necessary to clean the filters more frequently than otherwise would be the case. At Hampton, about eighteen months ago, he converted a storage reservoir into a subsiding reservoir. Although it only contained 45 million gallons, they reaped great benefit from passing the water into this reservoir, and drawing it off from the top on to the filter. They found it eased immensely the work on the filters, and caused them to last perhaps 50 per cent. longer than they did before without requiring to be cleaned. He quite agreed as to the necessity of fine sand; and, of course, their filters were arranged so that they practically got the same run through the sand at all parts. He also agreed with what had been said in regard to the flood water. They found, even with the small subsidence they at present possessed, no difficulty in sending out water in a good condition; and respecting a bacteriological examination, they had no trouble in keeping down to within an average of 100 microbes per cubic centimetre. The chemist had not got quite to the bottom of this subject, because they had found on some occasions, when water had been taken by one assistant and examined by one chemist, they had had a result of 25 microbes per cubic centimetre; while on the same day they had had as many as 500 discovered by another chemist. Of course, the microbes might come in shoals; but this was a very funny result. However, they were striving to attain to a perfect state; and these examinations and the chemical analyses were most important in keeping them up to their work. The general health and vital statistics of London were absolutely inconsistent with anything but an excellent supply of water.

Mr. Bertram Blount, approaching the subject only as a chemist, observed that in times of flood not only did the quantity of suspended material increase, but its quality was different from that which came down in the normal condition of the flow. Taking the inorganic constituents, there was, of course, a larger proportion of actual solid material. Then there was some organic matter extracted from manured land; and where there were drains and the like which did not normally deliver in great quantity into the stream, these were flushed out at flood times, and the stuff from them was brought down. All this material might have been breaking up previous to the flood; and, being in a highly unstable state, it yielded most objectionable matter. In this lay the real risk of flood water. As to the quantity brought down, there was naturally an exaggerated idea of the amount. Mr. Hervey gave the true state of things, which was that turbid water only contained an amount of material equal to something like 1½ grains per gallon. This had a most important practical bearing, because the quantity of suspended matter in a water evidently regulated to some extent the effective capacity of a settling reservoir. If there was a vast quantity of suspended matter brought down every flood, serious silting up would occur. The statement that the peaty moorland water was improved by the contemporaneous presence in it of a certain amount of clayey matter was an important one; and, if examined, it would be seen that it was entirely consonant with experience in other directions. It was known that all sorts of colouring matter were induced to precipitate by the presence in the water of some material which would act as a base for it to deposit on. They might imply from this that, when two classes of flood water were mingled, their clarification would be more easily effected than if they were impounded separately. With reference to Mr. Eaton's remarks, he (Mr. Blount) thought they might perhaps strain to get water so pure at such an expense that it might not be worth while; but this was rather a different thing from saying that if the water was too pure, it would not do them any good.

The Hon. R. C. Parsons, who had had a great deal to do with the filtration of flood waters abroad, said it seemed to him, when engaged on this work, that the great thing was to allow the water to subside as much as possible, for this reason that, when a filter was clean, it was impossible for it to do its work properly; and so the longer they could keep the filter from being cleaned, its operation was so much the better. Therefore the more they could allow the water to subside and relieve the filter, so much the more would the condition of the water be homogeneously good.

Mr. Hunter wished to add to his previous remarks that the Grand Junction Company were quite alive to the desirability of having extensive storage; but as they were engaged with the New River and West Middlesex Companies in constructing a large reservoir at Staines, where they would have 800 million gallons of storage, they were doing nothing specially on their own account at present.

Mr. J. Scott Moncrieff pointed out that there was a close association between the bacterial activity which occurred in water and the turbid contents. This would be readily understood when it was remembered that each of the particles in the water formed more or less a raft or resting place for these organisms. As to the remarkable purifying effect of sedimentation, the mere act of the descent of the suspended matter took a considerable number of microbes with it.

Mr. Hervey, in his reply, stated that the tests made from month to month by the Chemists engaged by the London Water Companies and by the Government Examiner of samples of water taken at the inlet and outlet of the reservoirs showed that the diminution of the microbe between these two points was very marked.

The Chairman, in closing the discussion, stated that at Manchester no filtration of the water was carried out. The water was received, even in a state of turbidity, into the reservoirs, and was decanted from one reservoir to another. They had also the means of separating the water; and the turbid water could be passed over for the purpose of compensation. They found great benefit from this decanting process. Of course, where an undertaking had only two reservoirs, it was scarcely possible to take in all the flood water; and then it must be filtered. Where, too, there was only one reservoir, all the water must be filtered. But where there was a succession of reservoirs, and means for diverting the water, filtration could be avoided, and the water improved simply by settlement and subsidence. Many of the towns in the north worked upon this principle.

The second paper was by Mr. James Watson (Bradford), and was on the subject of

THE RATE PER HEAD PER DAY OF WATER SUPPLY.

The author said that many well-informed authorities set up as a standard a certain number of gallons per head per day, which quantity they contend ought to have a somewhat wide, if not universal application; but in water supply, as in other matters "circumstances alter cases," and prescribing for acceptance any more or less empirical unit of supply per head per day, may mislead as to fact and be found unattainable in practice. The habits and characters of the peoples differ, the composition of the waters often largely differ, sanitary appliances, public health wants, trade demands, the number and availableness of streams, wells, and underground waters, the relative number of baths, water-closets, hot and cold water fittings per head of the population, the public, domestic, and trade rates, together form a chain, any length of which *per se* might constitute a cause of differentiation per quantum, and taken in part or as a whole are items of inclusion absolutely essential to the just and proper consideration of the causes which increase or diminish the rate per head of supply in different towns.

Illustrating this, the author pointed out that Bristol with 22 gallons per head per day has a full and ample supply, and that Glasgow, with 50 gallons per head per day is extravagant, if not wasteful—statements, which (without a full analysis of the respective circumstances and wants of the communities referred to) are at best but an expression of concrete truths, which further consideration might or might not modify, if not altogether alter, and invert the meaning conveyed by the use of such statements. Here there was a difference of 230 per cent.; yet the cause or causes operating to produce this contrast are not far to seek. The Glasgow supply from Loch Katrine is 1° of hardness, and for ordinary ablutions and detergent purposes, the minimum of soap and the maximum of water is used. The revenue from non-domestic and trade supplies amounted last year to £120,136 (out of a total revenue of £211,372), which, taken at 4d. per 1000 gallons, gives 7208 million gallons, or nearly 20 million gallons per day (out of a total consumption of 51½ million gallons per day), being 19 gallons per day per head of the whole population supplied. In addition, large unmeasured quantities of water are given free to the other public departments for public health purposes, swimming-baths, sewers, flushing streets and closes, washing, &c. As regards Bristol the conditions are practically reversed, the water is 22° of hardness, which means much soap and little water to form a lather tolerable to the skin, or having advantageous cleansing properties. Again, water

is not provided free at Bristol to any of the Corporation departments; and the price of 6d. to 1s. 6d. per 1000 gallons charged for non-domestic purposes, against 4d. charged in Glasgow, tends to limit the trade demand.

Bradford, within the city boundaries, consumes 40 gallons per head per day, 20 gallons of which are used for trade purposes; and this quantity does not include water for public health purposes, streets watering, &c. But, contrasted with Glasgow, which is a water-closet town where water-closets and baths are included in the domestic rate of 6d. per pound of rental, Bradford, like many other English towns, cannot be well compared. Bradford as yet can hardly be called a water-closet town, having one water-closet to each 16 persons, and one bath to each 38 persons; while, in addition to the domestic rate, special charges are made for baths and water-closets. Comparing Bradford with Bristol, the whole supply per head of Bristol would not do more than meet the trade and public health wants of Bradford. The supply to London is about 33 gallons per head per day, Edinburgh 38, Dublin 38 (all residential cities), Liverpool 29¾, Manchester 28, Belfast 35, Dundee 48, and Aberdeen 43 (these being commercial and manufacturing centres). If the factor of preventable waste be eliminted, then it follows that these differences are the results of the legitimate wants, or, at all events, of the free and unrestricted user of the water by the inhabitants.

Waste is the cause, and the only cause, of the increase of consumption (where proper rules and regulations are in force) which can be dealt with directly by the administrative engineer. In connection with this branch of the subject, the author did not wish to be understood as inferring that those rules and regulations which compel the use of a 2-gallon flush for a water-closet err in parsimony, nor that those which allow a 3-gallon flush err on the side of extravagance; yet this important difference is but one of the many authorized and legitimate differences which bear directly on the causes which increase or diminish the rate per head of supply in particular instances. In addition to constant systematic inspection, attention to the cover over service-mains, the insulation of house service-pipes, the strength of pipes, length of lever, diameter of ball, seats of taps, &c., relative to the maximum working pressure, eradication of old and worn fittings within a fixed limit of time, and the careful examination and testing of all new water-fittings at the hands of the water-works authorities, will, if carefully carried out, tend in the future to minimize the one wholly unsatisfactory cause of increase in the water supply of every town—viz., "waste."

Discussion.

Mr. E. Sandeman stated that when he took charge of the Plymouth Water-Works some years ago, the consumption was 58 gallons per head per day; but, by the adoption of waste-water meters, they reduced it to 42 gallons. Out of this, they had a trade supply of 17½ gallons; so that really the domestic supply was only about 24 gallons. The population being a residential one, baths, hot-water apparatus, and other things increased the quantity required for domestic purposes.

Mr. E. M. Eaton said that, under the provisions of an Act of Parliament, constant supply was introduced into Sheffield in 1869; and prior to that an intermittent service of twelve hours daily had been furnished. With the advent of the constant supply, the waste of water caused the daily consumption to run up from 20½ gallons per head to 41½ gallons; the result being that the reservoirs became exhausted. At the end of 1870, regulations as to the prevention of waste were brought into operation. Within twelve months, the consumption was down to 26 gallons; and by the end of 1874, it was under 20 gallons for all purposes. To take the gross quantity per head per day for water supply was wholly illusory. In all cases the meter supplies should be deducted from the total, because they were incomparable one town with another. Having given examples, he said that the moment they got outside the meter, there was no conscience in regard to water supply. People thought it cost nothing, and had no idea of the expense of its storage and distribution; and they allowed it to run to waste in a scandalously wasteful manner. The point to consider was how to deal with the residue after deducting the trade supply. Since 1875 at Sheffield, they had had the consumption other than meter supplies oscillating between a trifle over 12 gallons and 14¾ gallons, depending upon the character of the season and whether they had had any disputes with the consumers; for they generally found that, after a dispute, the consumption went up. (Laughter.) However, these figures showed what could be done by systematic inspection. In the Provinces, the introduction of water-closets and baths into new property of the class in which no one dreamt of putting them before, would in the future materially increase the rate per head per day.

Mr. James Mosse referred to the extraordinary quantity of water used in Canada and the United States when he was there some years since. He believed it was about 97 gallons per head per day in New York; in many towns in Canada it was above 100 gallons; and so far as he remembered, it was 130 gallons in Toronto. The waste was most extravagant there.

Mr. Favell pointed out that at St. Helens the supply was 40 gallons per head per day; while in the case of the Staffordshire Potteries Water Company it was 20 gallons. Both were manufacturing districts with small class houses. But at St. Helens, the trade supply was 17 gallons, the Corporation took from 3 to 5 gallons, and the domestic supply was 18 to 20 gallons. In the Staffordshire Potteries district, the trade supply was only 3½ gallons, and the domestic 16½ gallons. When Mr. Harrison took charge of the works 25 years ago, the service-pipes were in an awful condition; but, by systematic inspection, he had remedied them, with the result that the consumers had a constant supply at a good pressure.

Mr. Martin confirmed what had been said as to the large consumption in the North American States. But it must be remembered that 120 United States gallons equalled 100 Imperial gallons. It was quite a common thing there, too, to distribute unfiltered river and lake water; and consequently, not being nearly so expensive, there was no inducement to keep down waste. He advocated placing garden supplies on meters.

Mr. H. W. Pearson (Bristol) corrected the statement of the author that the hardness of the water at Bristol was 22°; it was only 14° to 16°. Out of the total consumption of 22 gallons per head, 6 to 7 gallons were used for trade purposes. He believed that one of the great causes of leakage was the laying of service-pipes too shallow. During the last twelve or thirteen years they had had a waste-meter system in use in Bristol; and they had reduced the consumption by 2·8 gallons per head—a great deal of the saving being due to the system. During the last ten years, they had had an increase of 50 per cent. in some of their meter supplies.

Mr. Wilson was of opinion that boilers in kitchen ranges, inducing a liberal use of hot water by domestics, were a cause of waste; and he suggested that, if a simple approximate water-meter could be invented, it would be wise for water authorities to adopt the system of charging by measurement.

Mr. E. J. Silcock (Leeds) thought that when they saw three or four large towns scrambling for one watershed, it behoved every town to put off the evil day when they would have to seek a new gathering-ground. It was therefore of vital importance that waste should be prevented to the utmost extent.

Mr. O. J. Kirby (Batley) had found great waste from washing-basins supplied with hot water, through the water being allowed to run to waste until the hot arrived. His remedy was the fixing of the cylinder somewhere in the basement or kitchen near the boiler, so that there could be a return circulation. He proved the waste in this respect by metering one side of a street in a residential part of the town; and the consumption ranged from 50 to 60 gallons per head per day. He then altered all the hot-water apparatus in the manner suggested; and ultimately the consumption was reduced to 20 gallons.

Mr. J. Simmons (Doncaster) related how, by a comprehensive system of inspection, the supply in the town had been reduced from 30 to 18 gallons.

Mr. R. Askwith stated that the Weardale and District Water Company with which he was connected supplied an area of 300 square miles. The district was hilly, and consequently the pressures were great; and it was undermined by colliery workings. They had upwards of 250 miles of service-pipes, independent of some 3-inch cast-iron pipes, owned by private consumers, for supplying isolated places and small villages. The total population served was about 150,000. His experience under these conditions led him to the opinion that the question of the quantity of water used depended entirely upon the fittings. The consumption in the district was under 10½ gallons per head per day for domestic purposes. The Company undertook to keep the taps in repair and renew them when necessary for 1s. per annum; and by this arrangement they now dealt with nearly 20,000 taps. This gave them an income of £1000 a year, and enabled them to keep a staff of plumbers going from house to house like postmen. To this he attributed the lowness of the consumption.

Mr. H. Ashton Hill (South Staffordshire Water Company) said that in his case he had 650 miles of mains; and the water was pumped at pressures up to 200 lbs per square inch into a very hilly district. It was a colliery district; and in many parts they were subjected to frequent bursts. Notwithstanding all this, the total consumption was under 20 gallons per head per day. They had a trade supply of about 7 gallons; and the domestic supply was equal to 12¾ gallons. His experience was that not only did the rate per head vary in different towns, but in individual towns and districts it varied to the extent of double and three times the average—sometimes legitimately so.

Mr. Watson, in his reply, said it appeared that the only thing an engineer could do to diminish the consumption of water was to curtail as far as possible the factor of waste; but the habits of the people were quite beyond the control of the water-works authorities.

The Chairman, on behalf of those present, thanked the authors for their papers.

BRITISH ASSOCIATION OF WATER-WORKS ENGINEERS.

We to-day give an abstract of the first of the two remaining papers read at the recent meeting of this Association, with an outline of the discussion. It was contributed by Dr. Ad. Kemna (Antwerp), and dealt at considerable length with the subject of

THE BIOLOGY OF SAND FILTRATION.

Having mentioned that in the valuable work on sand filtration by Allen Hazen the number of people in Europe supplied with

sand-filtered water is estimated at over 20 millions, the author said that there has never been any variance in the requirement that water should be pure, but our conception of purity has changed in order to keep pace with the progress of science. Three successive stages can be distinguished in this evolution; and, although the transitions have been rather sharp and well marked, there have survived to the present day remnants of the former stages. It is generally stated that the first sand filter was erected in 1829 by Simpson, for the Chelsea Company. He aimed at a mere clarification of the water, and found his plant answered the purpose—the filter simply straining the water. The suspended particles were arrested on the top of the sand, because they were larger than the interstices between the grains, or could not wind their course through the sinuous channels in the depth of the mass.

The second period was characterized by the growth of hydrological chemistry. A large amount of scientific labour has been bestowed on the task of determining the composition of waters. As to the mineral constituents, scientists agree pretty fairly, except as to hardness. But as to the "organic matter," there are a great variety of methods, results, and ways of stating figures. But it happened that sand filters, devised to meet the requirements of the first period, proved equally efficient for chemical purification; and their beneficial action was most marked on precisely those organic substances as to which the greatest stress was laid by hygienists.

As the second period was characterized by a mainly chemical conception of purity, so the third period witnessed the extremely rapid rise of biology and bacteriology in all questions connected with water supply. Several epidemics were distinctly traced to specific contamination of the water supply; and the efficiency of filtration was attributed to the vital action of plants, lower animals, and microbes. When an experimental filter is started with clean and sterilized sand, only the grossest suspended particles are arrested; there is neither chemical purification nor reduction in the number of microbes, so that the efficiency of the filter is restricted to its mechanical action of straining. After a couple of days a layer of dirt has accumulated on the top of the sand, and then the filter is found to be working both chemically and bacteriologically. Now, if this surface layer is examined it is found to be teeming with life—green and blue algæ have interwoven their filaments into one felted sheet; diatoms, with their siliceous frustules and gelatinous envelopes, fill up the meshes; zooglæa stick on every particle, and innumerable bacteria dot the whole mass. The first effect must be the blocking up of the interstices between the grains of sand; the sticky nature of the covering also increasing in a marked degree the mechanical action of the filter. Next it is to be considered that all this material is alive. Plants are known to purify the medium in which they thrive; and the biological nature of fermentation has been advocated and experimentally demonstrated. Vegetable and bacterial life must needs alter the chemical composition of the water, and more especially destroy the organic compounds; and so biological theory gives a good explanation of the chemical action of the filter.

The bacteriological reduction is a very marked feature with sand filtration; 96 to 98 per cent. being common figures. At Antwerp, with a raw material producing 10,000 to 100,000 and even more colonies per cubic centimetre, the water after filtration is constant for months at 20. The microbes are not generally killed; on the contrary, they multiply enormously in the surface layer—the only possible explanation being that they get caught in the slimy layer on the surface of each grain of sand, so that the filter acts towards them like a spider-web. There are, however, at work in a sand filter causes which tend to destroy the microbes. Light has been shown, by direct experiment, to be a very active agent in this respect; so that open filters are better than covered ones, unless the low winter temperature requires a protection against prolonged frost. According to a recent work of Dr. O. Strohmeyer, in the laboratory of the Hamburg Water-Works green algæ are extremely energetic against microbes, sometimes effecting complete sterilization in less than a day. Although the experiments appear to have been made carefully, the results are so startling that a confirmation might be a good thing. Perhaps the oxygen evolved by the plant is in the nascent state, or in the form of ozone, which is practically the same thing; and ozone has recently been proposed to effect the complete sterilization of water.

Although the microbes taken in bulk increase in number, it is very probable that some species may diminish or even totally disappear; there being a keen competition and struggle for life. This is especially important from a hygienic point of view, as most pathogenic bacteria adapted to parasitic life are not quite at home in ordinary water, and are easily overpowered by the more essentially aquatic forms thriving in the surface layer of the sand. Moreover, it has been shown that a water which has passed through a stage of preliminary contamination—such as is the case with most waters which require sand filtration—is not even after purification so good a cultivating medium as a naturally pure water, the previous development of bacteria seeming to have innoculated the water to a certain degree and for a certain time. Something of this kind has been stated to happen with the water of the Ganges, as it proves uncongenial to the cholera bacillus; so that, given two supplies—one of natural spring water and the other of some sand-filtered river water—contamination in the first case is likely to prove much the more dangerous of the two.

In the course of a learned explanation as to the nature of the algæ found in filters, the author said that the blue algæ are undoubtedly on the lowest stage of organization; and the green algæ also start from very simple forms, but attain to a much higher organization. The brown algæ, or diatoms, are a side branch characterized by a siliceous envelope composed of two parts, one overlapping the other, exactly like a wooden box and its cover. Besides the plants generally resting on the top of the sand, owing to their being heavier than water, those which float must, the author remarked, be taken into consideration. Their buoyancy is the result of their protoplasm being specked with oil globules or with small bubbles of gas. Most of the bottom dwellers rise occasionally to the surface, when the oxygen evolved from brisk nutrition accumulates in their entangled masses. This is very important in practical sand filtration, as the covering is taken away, and water allowed to pass more freely through the patches where the sand is laid bare; and the number of microbes in the effluent is found to increase markedly under these conditions. The biologist must be constantly on the look out; and when he sees a filter with a great quantity of these ordinary bottom dwellers floating on the surface, the yield of the filter should be at once diminished—in fact, such a filter should be worked with the same precautions as a new one. The normal floating species, now generally designated under the collective term "plankton," also get to the bottom when they die. They sometimes appear in enormous numbers, as thick clouds imparting a distinct colour to the water. Very serious trouble may arise from this cause. The filters are blocked in a short time; drawing the water through a layer of decaying material impairs its quality; and some of the plants give off offensive odours even in the fresh state.

At Hamburg it has been shown that there is a certain regularity in the nature of the plants found constituting the filtering film. In winter the diatoms are, so to say, alone, and the number of their species is largely diminished when compared with what can be found in summer; but a few species make up the deficiency by the enormous numbers of their individuals. Green algæ appear early in spring, and develop to a large extent in summer. The blue algæ are numerous in the hottest months, and keep on growing in autumn; but they disappear in winter. During all these periods diatoms are constantly present, and are, therefore, of great importance, as they may really be considered as *the* filtering agent. On the whole, the author is able to confirm these results from his experience at the Waelhem works of the Antwerp Water Company. The floral changes which in turn bring into prominence the brown, green, or blue algæ are undoubtedly, in his opinion, due to the regular change of seasons. He has often noticed at these periods that, without any apparent cause, the bacterial results of filtration are impaired in a manner which the floral change may perhaps account for.

The animal kingdom, the author observed, also contributes its share of trouble to the water engineer. The fresh-water sponge is of frequent occurrence in ponds and reservoirs, attaching itself to stones and wood. As these sponges thrive on suspended organic matter, they tend to clarify the water; but, on the other hand, when they decay, a most offensive smell is given off. Another form of adhering animal life are the bryozoa, or fresh-water polyps (the so-called "moss"). These have a special tendency to fix their horny-branched tubes upon iron; and the author has had a 24-inch pipe coated inside all round with such a growth 10 cm. thick. He got rid of it by steaming and flushing. The swimming fresh-water order of cladocera is also a close acquaintance of the author's. He described their prolific development; stating that at certain times ponds get absolutely crowded with them. In 1896 they were in thick clouds in his reservoirs and filter-basins; their dead bodies accumulating in a thick layer on the top of the sand. He resorted to screening the water through wire gauze. For several weeks six men were kept busy night and day working the screens; and the total quantity taken out was over 10 tons.

Certain insects which sometimes affect sand filters were also referred to, and then the author showed the necessity of having the openings of all pipes above the level of the water in filters protected by wire gauze, in order to prevent the admission of eels. He also recounted a curious experience with sticklebacks. At the Waelham works, the water is raised to the filters by spiral pumps, and the small delivery tank of each pump is fitted with a screen. On May 24 one of the pumps broke down, and was replaced by a centrifugal, but the screen in the tank had to be taken away. That day filters Nos. 3, 7, and 8 gave respectively 14, 34, and 32 microbes per cubic centimetre; the following day the numbers ran up to 258, 292, and 242; the third day the results were good again. On filter No. 7 being cleaned, it was noticed that there were patches of sand with numerous perforations of the upper layer; each group of perforations being regularly distributed round a central larger hole. There were about 20 of these clusters, of a total area of 12 square metres. In filter No. 8 the patches numbered 100. On careful investigation it was found that the central large hole of each cluster was covered up by threads of algæ, weighted with small pebbles, and that under this covering there was a mass of eggs of the ordinary stickleback. Filter No. 4 showed the same characters. The removal of the screen allowed the sticklebacks to reach the

filters. The spawning period of the species falls in the end of April and beginning of May.

Discussion.

Mr. F. GRIFFITH said at Leicester they had four sets of filters at four different stations; and he could follow thoroughly and most interestedly the whole of the points raised by Dr. Kemna. They had constant trouble with their sand; and they were obliged to change the beds every eight or ten days in the summer, and at fortnightly intervals in the winter.

Mr. C. E. JONES (Leyton) proposed a vote of thanks to the author. It was, he remarked, highly appropriate to open up such a wide question of study as that of the bacteriological examination of water in this Association, the members of which were specially interested in it, and, he hoped, qualified to assist in its study and elucidation. He rather joined issue with the Doctor as to the lack of scientific interest on the part of English hydraulic engineers.

Mr. H. ASHTON HILL (South Staffordshire Water Company) seconded the motion; observing that the subject was one which would have to be studied more in the future by water engineers than it had been in the past. He supposed that Dr. Kemna's assertion as to the lack of interest in this matter among English water engineers was founded on an idea that they were not so fortunate as the continental nations in chemical and other sciences. He (Mr. Hill) thought there was some ground for this; they recognized it, and were prepared to make good the breach. In his own case, he had a completely equipped laboratory, and a thoroughly qualified assistant in charge of it, who was studying the question from the standpoint Dr. Kemna had spoken of. He had sometimes remarked to his engineering assistant that, if they had to attend altogether to what the chemist told them, they would have to "shut up shop." However, he had no doubt that more would be demanded from water engineers in the future than hitherto. He mentioned a peculiar circumstance that had come under his own observation. He had been filling a new open reservoir with sandstone water. The water vegetated, and caused him some trouble for a time. His chemical assistant found out that the hardness of the water was altered. While the well water was 60° of hardness, that in the reservoir had dropped down to 40°. He also found out that this was due to the fact that the plant life (algæ) required sulphur for its growth; and this it obtained from the sulphate of calcium in the water, the decomposition of which resulted in a reduction of the hardness.

The motion was heartily agreed to.

Sir JOHN MURRAY (Edinburgh) remarked that he had been working in this direction, but chiefly in connection with sea water; and he was glad to hear of this practical application of biology to the very practical question of water supply. He suggested that it might be a good thing for water-works authorities to employ some of the young biologists from the universities to carry out investigations as to what was going on in the different water supplies of the country. They might get practical results, and do some good.

Professor WANKLYN wished to point out one thing, and it was this—that, where they had precipitation of any kind in water, certain effects arose which were due to physical and chemical changes. Biologists should be very careful not to mistake some of these chemical and physical changes for real life changes that came under the head of biology.

Mr. R. W. SMITH-SAVILLE (Darwen) said he had two reservoirs, the top one of which was filled with water containing a lot of peat, and the lower one with water containing only a little peat. In February, after the heavy rains, and when the water was no doubt charged with organic matter, they had a bacteriological examination made. In the water from the top reservoir 356 bacteria per cubic centimetre were found, and in that from the lower one 334 bacteria. The bacteriologist thought this was too many, and suggested that the filters were not working properly. A further examination was made, and in the water from the upper reservoir before filtration only 39 bacteria were found; but the water running out of the filter contained 868, and that in the pure-water tank 1078. This seemed to indicate that there was something wrong. They had the filter run off, and the under-drains examined. It was discovered that these were about a quarter full of a slimy, yellowish-white substance, containing an average of 15,000 bacteria per cubic centimetre. The water from the lower reservoir was all right. The trouble appeared to have been due to the stormy weather affecting the water which ran into the top reservoir. The sand of which the filter was composed was 3 feet in depth; and it was formed of stone taken from the vicinity. The acidity of the water, so far as he could see, acted on the concrete and dissolved the cement, and nothing but the coarse stuff remained. This had been eaten into, and so fed the bacteria which passed through the filter. He did not think water engineers could spare the time for adding to their other accomplishments that of bacteriology; and small undertakings certainly could not afford to keep a bacteriologist on the premises.

Mr. R. ASKWITH (Bishop Auckland) said it had been stated that light was a very active agent in destroying microbes; and therefore uncovered filters were better than covered ones. If the water was taken from an unpolluted source, it appeared to him that covered filters which would prevent the quick growth of bacteria, and thus keep in order longer, were preferable to uncovered ones, where they had in a short time "carpets" of living matter which prevented the water becoming filtered. He had filters covered with slated roofs, which filtered from 1½ to 2 million gallons of water per day. After the beds were cleaned, light was allowed to reach them for about 48 hours. Then, when a growth had begun, and they thought the filter was in good working order, the light was excluded. One set of these beds had been going on now for more than twenty years; and they had never succeeded in getting an analysis showing the water was bad.

Mr. JONES observed that the East London Company obtained some of the best results of filtration in London; and one of the features of the system was that the water did not see the light of day until it was drawn off at the tap by the consumer. He was distinctly of opinion that exposure of water to atmospheric influences after being filtered was a decided mistake.

Mr. W. A. RICHARDSON spoke of his experience with open reservoirs at Birkenhead and closed ones at the Tranmere Water-Works. At the former considerable annoyance was experienced owing to the growth of vegetation; but the experience at Tranmere had led to the Birkenhead reservoirs being covered. Since then there had been no trouble through vegetation; and the water was pronounced exceedingly good.

Mr. W. G. PEIRCE (Richmond) stated that he had charge for seven years of a water-works connected with the War Department; and there they had an open reservoir. In the summer time this became coated with green vegetation; and small red worms were produced. The military doctors were divided on the subject of covering the reservoir; but eventually it was roofed over with galvanized iron, and after that there was no further trouble.

The PRESIDENT (Mr. W. Watts) had not the slightest doubt that water was greatly benefited by exposure by agitation and aëration. On exposure of water in bulk, they found certain matter floating on the top; and it was a question whether the light, warmth, or air did not bring to the surface this matter—those forms of life which might ultimately have found their way into the stomachs of the water consumers. While he was serving the Oldham Corporation, they, in order to reduce the pressure in the lower zone of the town, built a reservoir to hold 21 million gallons. The reservoirs at the source which fed this reservoir received water from a drainage area of some 1450 acres. Invariably the water in the large reservoir at the source was free from many of the lower forms of animal life—cyclops in particular. Singularly, by the time this water had passed through a line of pipes a distance of 6 miles to the supply reservoir, the cyclops had multiplied, he might say, *ad infinitum*—in fact, to such an extent that the reservoir had to be given up. Wherever there were forms of life, there must be food; nothing could live without nutriment.

Dr. KEMNA acknowledged the vote which had been passed. He remarked that in his paper he had tried to show how in the run of years the question of sand filtration had become more and more complicated—it had risen from a simple mechanical process to a chemical, bacteriological, and biological operation. A great deal of attention was given to biology on the works of which he had the management, for two reasons—because he happened to have a great tendency to biology, and because his water fostered a great deal of animal life. But due recognition was paid to chemistry; the water being analyzed every day for organic matter. To revenge himself for the doubt thrown upon his work, he might add that he always employed Professor Wanklyn's test for free and albuminoid ammonia. In considering the question of filters and reservoirs being covered or uncovered, it must be remembered that filters and reservoirs were two very different things. In the case of a filter, they had to start with the idea that the purifying action was a biological one, and that it was performed by the surface layer of organisms, chiefly plants. It followed that they must, as far as possible, favour the growth of these organisms; otherwise they would get no filtering action, no production of chemical composition, and no sticky layer to arrest the microbes. Was it light or darkness that favoured the growth of these conditions? There could be no doubt that the greater efficiency was obtained by the open filter. Mr. Askwith dealt with his filters in a very practical way—in fact, his method was perfection. It was quite true that the danger was not in the enemy that could be seen, but in the foe that was unseen, and that was the microbe. It must be quite understood that, in writing his paper, he had left the microbial part of water filtration as much aside as possible, and confined himself to the biological side.

Damage to Gas-Pipes at Carmarthen.—At Carmarthen, the Town Council have been discussing proposals from the Gas Company for a settlement of all cases of breakages of gas-mains through the carrying out of the Corporation work. The conditions are that where, through the action of the Corporation in making streets or carrying out repairs, any pipes or mains of the Company were broken, the cost of renewal should be borne by the Corporation and the Company equally; the Corporation to pay for the actual loss caused by the escape of gas. The proposals evoked considerable discussion in the Council, in the course of which it was remarked that the Corporation were the Gas Company's best customers, and paid them £700 a year for gas, and were therefore entitled to very liberal treatment. A resolution to accept the Gas Company's terms was lost, and an amendment carried that the Corporation pay for half the cost of repairing, and nothing for the waste of gas.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

Municipal Trading.

SIR,—The Committee of the Gas Companies' Protection Association have considered the proposed appointment of a Joint Committee of the Houses of Lords and Commons to consider the question of municipal trading, of which Sir William Walrond has given notice, and they have passed resolutions of which the following is a summary: (1) If Committee be appointed, Association should give evidence before Committee. (2) Nature of evidence, &c., to be dealt with by Sub-Committee. (3) Copy of minutes of Committee to be sent to each member of the Association. (4) Summary of minutes to be sent to the "JOURNAL OF GAS LIGHTING."

Will you allow me to say, through your columns, that if any gas company, not members of the Association, have any remarks to make on this subject, my Sub-Committee will be very pleased to consider them?

5, Victoria Street, S.W., June 15, 1899. FRED. E. COOPER, Secretary.

The Lawson Tait Hot-Water Apparatus.

SIR,—It must not be forgotten that for many years before Dr. Lawson Tait published his ideas on the subject, many forms of continuous hot-water supply were in the market, and they have the advantage that they are tenant's fixtures, easily removable and fixed in another house at a trifling cost. One of these has been at work day and night in my own house for more than fourteen years, and has done everything we require; and when removing to a new house, it was taken down and refixed in a few hours. Dr. Tait's arrangement, shown in the "JOURNAL" last week, is much too costly for any tenant to fix in a house which is not his own property; and this alone would prevent its adoption when much simpler arrangements are to be obtained.

Warrington, June 17, 1899. THOS. FLETCHER.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills brought from the Commons, read the first time, and referred to the Examiners: Blackpool Improvement Bill, Darwen Corporation Bill, Dublin Corporation Bill.

Bills read a second time and committed: Belfast Corporation Bill, Bootle Corporation Bill, Woking Water and Gas Bill.

Bills reported, with amendments: Nottingham Corporation Bill, Rhondda Urban District Council Bill, Shirebrook and District Gas Bill, Workington Corporation Water Bill.

Bills read the third time and passed: Gas Orders Confirmation Bill (No. 1), Gas and Water Orders Confirmation Bill, Shotley Bridge and Consett District Gas Bill, Water Orders Confirmation Bill.

The opposition to the Wetherby District Water Bill has been withdrawn.

The Gaslight and Coke Company Bill has been referred to a Select Committee, consisting of Lord Brougham and Vaux (Chairman), the Duke of Marlborough, the Earl of Dartmouth, Lord Windsor, and Lord Bolton; to meet on Thursday, June 22.

The East London Water Bill and the West Middlesex Water Bill have been referred to a Select Committee, consisting of Earl Spencer (Chairman), Viscount Falmouth, Lord Boston, Lord Crofton, and Lord Sudley; to meet on Thursday, June 22.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bill reported, without amendment: Wishaw Water Bill [Lords].

Bills reported, with amendments: Airdrie and Coatbridge Water Bill [Lords], Barton-on-Sea Water Bill [Lords], Bradford Tramways and Improvement Bill, Derby, Leicester, and Sheffield Corporation Water Bills (consolidated into the Derwent Valley Water Bill), Dundee Gas, &c., Bill [Lords], Gainsborough Urban District Council Gas Bill [Lords], Glasgow Corporation Gas and Water Bill [Lords], Lanarkshire (Middle Ward District), Water Bill [Lords].

Bills read a second time and committed: Cobham Gas Bill [Lords], Totland Water Bill [Lords], Whitehaven Corporation Bill [Lords].

Bills read the third time and passed: Blackpool Improvement Bill, Darwen Corporation Bill, Dublin Corportion Bill, Dumbarton Burgh Bill [Lords], Stockton and Middlesbrough Water Bill [Lords].

Dispensing with Contractors.—At Newport (Mon.), it has been decided by the Water Committee to recommend to the Council that the necessary work of pipe-laying, &c., and conveyance of the Wentwood water for distribution to Newport, shall be done by the Corporation without a contractor. The total outlay upon the Wentwood scheme now amounts to upwards of £158,000.

The Farnham District Council and the Gas-Works.—The Bill to confirm the Provisional Order applied for by the Farnham Gas Company to enable them to maintain and continue their existing works came before a Committee of the House of Lords last Wednesday. It was opposed by the District Council, practically with the object of procuring the insertion of a clause to allow of the acquisition of the undertaking as a non-statutory one. The Committee granted the clause, which gives the Council power to purchase within one year, but requires them to take up the Company's guarantee to the rural district, and also to submit a clause reserving to the Rural District Council power at any time to purchase the mains, &c., in their district.

HOUSE OF COMMONS SELECT COMMITTEE.

Tuesday, June 13.

(*Sir* JAMES RANKIN, *Chairman.*)

THE POWERS OF CHARGE OF THE METROPOLITAN GAS COMPANIES.

The Select Committee of the House of Commons appointed to consider the above subject resumed their inquiry to-day.

Mr. GEORGE LIVESEY was recalled, and further examined.

The CHAIRMAN: I think you were dealing with the question of residuals. Have you anything more to say about that?

Witness: Yes, I think so. If you will allow me, however, I should like to say a few words personally. I am not here to say anything about the South Metropolitan Company as having done anything extraordinary. We have done no more as a Company than others have done—the Commercial, for instance, considering their circumstances; and I do not wish to set up the South Metropolitan Company as a model in any respect. The only thing we have done out of the common has been to make our workmen partners, and get them as shareholders. Others have served the consumers quite as well. Then there is another matter. It is the very furthest from my wishes to make an enemy. What I said about a certain gentleman on the last occasion, I said simply because I believed it to be the truth. The House of Commons wants information from me, and I give it fully. I have no personal feeling against anyone.

The CHAIRMAN: I think that is quite understood by the Committee at any rate.

Witness (continuing) said he had made an error in his proof in stating that one of the reasons for the difference in the prices charged north and south of the Thames was that The Gaslight and Coke Company had sold their residuals so badly. This was not correct, because if the Company had sold better, the South Metropolitan would also have sold better; and the difference would consequently remain. With regard to ammonia, as with other matters, the object of The Gaslight and Coke Company was to get the highest possible prices. Ammonia at the works was converted into sulphate of ammonia, which was used as manure. It was exported mainly, and was bought and sold by the Mincing Lane brokers. In 1894, the value of sulphate was going up, and had reached the price of £13 15s. a ton—a very good price, at which the South Metropolitan were very glad to sell. The Gaslight Company stood out for £14. The market would not give it. As a consequence, they accumulated a large stock between the summer and October of 1894. The brokers knew that this stock must come on the market, and so were quite uncertain about the terms; and from the time the stock commenced to accumulate, the price began to fall. The Gaslight Company sold a large quantity at £13 per ton in October, 1894. Then they held again; and in December of the same year they had to sell at £11. This large stock being held at Beckton depressed the price, until in 1896 it reached £7 a ton.

Sir F. DIXON-HARTLAND: What was the highest price of sulphate?

Witness: £14; and it went to half. The continual fall of price led to the absorption of the stock; and when the stock was all absorbed, the price began to go up. In 1897, it got up to about £9 or £9 10s.; and now it is £12 and more.

Mr. COHEN: Then they cleared out at £7?

Witness: They gradually cleared out. The accumulation of these large stocks unduly depressed markets, and our having to sell at £7 in 1896, instead of £10—which I believe would have been the minimum—caused us to lose £20,000, and I think The Gaslight and Coke Company £60,000. In trying to do their very best for the Company, the officers did not take the wisest view.

The CHAIRMAN: I do not understand that you lay it down as a rule that you should sell from day to day, whatever the price. I understand you to say they made a mistake in 1894 in not selling at £13 10s.

Witness: It is an accepted rule with gas companies not to accumulate stocks of sulphate. Seeing that sulphate and coke are things that we must produce, we must sell at the price the market will give from time to time. If we accumulate stocks, the invariable result is that the market is depressed very much.

Mr. COHEN: When you say "accepted," it does not appear to have been accepted by The Gaslight and Coke Company?

Witness: No, but by gas companies generally.

The CHAIRMAN: But you say it is better to sell it day by day or week by week, rather than accumulate a stock?

Witness: Yes; or month by month.

Sir F. DIXON-HARTLAND: You said that The Gaslight and Coke Company had lost £60,000 by not accepting the market prices of the day?

Witness: I estimate their manufacture of ammonia at 20,000 tons a year; and selling this at £7 instead of £10, makes a loss of £60,000. We do not follow their policy; we have always sold as we made it.

Was £20,000 lost to you in consequence of their policy?—Consequent on these low prices; my inference is that it is their policy that caused the loss.

The CHAIRMAN: If they withheld the stock from the market for some time, would that not have the effect of sending up the price while they were so doing.

Witness: No; because the market knows all about it, and that the stock will be put on the market. When The Gaslight and Coke Company accumulate a large stock, buyers never know what will happen. The broker buys to sell forward. He says: "I cannot afford to give the market price, or anything about it, because before I have disposed of this stuff they may flood the market with their stock." The impression is that the market goes to pieces by their action.

Mr. NICOL: Do you say it has always been the policy of The Gaslight and Coke Company to store?

Witness: They generally store. They do not sell so closely as we do. I heard that they sold at the beginning of this year, six months in advance, at £10. We did not; and we now get £12 for that which they sold in advance at £10.

The CHAIRMAN: Is sulphate of ammonia a commodity for which there is no constant demand?

Witness: There is a constant demand. It varies somewhat.

What do the persons who require it for this constant demand do while

companies are holding it back?—The demand fluctuates with agricultural or sugar growing prosperity. In prosperous times, the agriculturists and beet growers can afford to buy more than they can in unprosperous times; and therefore there will be a natural fluctuation of the market. But it is very much intensified by this holding of stocks, which prevents buying and selling.

As a rule, the holding of stock will have the tendency to drive the price up rather than down?—It does not have that effect with sulphate of ammonia.

I want you to go back to the question of the extra penny which North London is paying?—That was put by Mr. Hunt; certainly it never occurred to me. The Board of Trade at the time of the London amalgamation said: "We will not allow the south to suffer under this amalgamation." The two Companies—the South Metropolitan and The Gaslight and Coke—were competing for amalgamation with the London Company who had the area in the south, and a good deal on the north. One-third of their business was in the south, and two-thirds in the north. Lord Farrer (of the Board of Trade) years ago said to me: "I want as far as possible all the capital to come under the sliding-scale." The South Metropolitan Company's system of amalgamation was to bring it all under the sliding-scale." The Gaslight and Coke Company had a different policy and offered preference stock; and nearly all the Companies absorbed by The Gaslight and Coke Company took 10 per cent. preference stock. Out of their capital, about £6,000,000 is ordinary stock, and £3,250,000 preference. Most of the Companies accepted the preference—the secured dividend. We offered the London Company to come in and join us on equal terms; the ordinary stock to become ordinary sliding-scale stock. They thought the Gaslight Company the better security, and they threw in their lot with them. Then said the Board of Trade: "We will not allow the consumers in the south to suffer." They therefore made the proviso that the price of gas charged south of the Thames by The Gaslight and Coke Company should never exceed that of the South Metropolitan Company.

This 10 per cent. preference was a preference over the whole of the other ordinary stock?—Yes. There were various preferences. They were one after the other; but they have been converted *pari passu*. It was not seen at the time that, in order to sell gas at a lower price in the south, it must be made up in some way. The difference then was slight—about 4d., I think; but whatever it might be, it meant that unless the Gaslight Company were to forego dividend equal to the loss on the gas, it must be made up by charging more to the consumers on the north. Mr. Hunt said the 10d. difference in price between the north and south, meant that the north must make it good. About 2000 million feet of gas were supplied at the lower price in the south, and to all their public lamps. To supply this 2000 millions at 10d. less than the other 18,000 millions, meant that a penny more must be charged for the other.

Mr. COHEN: Why?

Witness: They make up the loss by charging it to the consumer in the north.

But is there a loss out of pocket involved?—Yes. They require rather over 1s. per 1000 cubic feet to pay their dividend. If they need a price of 2s. 11d. to pay their dividend, of course out of 2s. 2d. they only get a fourth of their dividend—3d. out of 1s.

Sir F. DIXON-HARTLAND: That 9d. comes from the northern side?

Witness: Yes.

Therefore the people in the north pay to make up?—Yes, and a little more, because by taking off meter-rents the Company actually supply some of the consumers at less than the South Metropolitan. We always charge meter-rents. Let me say this in justification for their taking off meter-rents: They were obliged by their Act to supply meters free of charge in the City—not in other parts of their district; and they said it caused dissatisfaction if a man paid no meter-rent at his place of business, and at his private house did. However, this had gone on for thirty years.

The CHAIRMAN: Have you anything to say with regard to the convenience or desirability or otherwise of The Gaslight and Coke Company having an area on the south side?

Witness: Well, I should say it is one of the worst things they ever did to take it. The reason they have the area is this: Mr. Phillips, of whom I have spoken in no disparaging terms, was an ambitious man; and his ambition was to get all London under his control—all the Companies absorbed by The Gaslight and Coke Company—so that there should be only one Company in London. Mr. Phillips was the General Manager of The Gaslight and Coke Company; and he carried out all these amalgamations. He got astride of the river for the purpose of getting a footing in the south; and he did go so far as to offer terms to the South Metropolitan Company—12 per cent. preference stock—but the shareholders refused. The Board of Trade said they would not allow one penny. They were quite firm on the principle that there should at any rate remain the competition of comparison. If it had been all one Company, there could have been no comparison whatever. After the amalgamation with the London Company, I suggested that they should sell the portion south of the Thames; and he used an expression perfectly friendly, but more forcible than polite. If the district on the south were transferred to us, it would be a benefit all round. The greatest benefit that could occur to those concerned was to reduce the price of gas; and if by the transfer the price on the north could be reduced 1d., it would be good.

It is your opinion that both Companies and consumers would benefit by a fair and equitable transfer of the southern area of The Gaslight and Coke Company to the South Metropolitan Company?—It would undoubtedly be of benefit all round. It might involve an application to Parliament.

In further examination, witness referred to the coal question. In the winter of 1897-8, it was perfectly clear that coal was going up. The South Metropolitan Company's contracts ran for a year—from April to March; The Gaslight and Coke, for a year also—but from July to June. In March, the South Metropolitan Company were negotiating for their new contracts. The price for 1897 was 6s. 6d. per ton f.o.b. for ordinary Newcastle coal; and the great bulk of the coal used by both Companies was ordinary Newcastle coal. The South Metropolitan Company recognized that an advance was necessary. A coalowner called on witness offering coal at 6d. per ton advance. Witness reported the offer to the Directors, and after a little higgling 3d. was accepted; and contracts for their ordinary coal for the year to March, 1899, were placed at 6s. 9d. per ton f.o.b. These contracts were settled just before the Welsh coal strike, which began in April. Two of the South Metropolitan contractors to witness's knowledge, and he thought a third also, went to The Gaslight and Coke Company and offered them coal at the same advance. To one the answer was: "Not a penny more will we give." To the other: "Not only will we not give you 3d. more, but we are going to have the 3d. off that was put on last year." The coal was not sold to the Gaslight Company. They stood out; and with the Welsh strike coming on, the result was that they had to pay from 1s. to 15d. per ton more. The increase they paid on their 2 million tons last year was close upon 1s. more than what was given by the South Metropolitan Company. One shilling a ton on 2 million tons was £100,000. This, in his opinion, went a long way towards necessitating the increase of price from 2s. 10d. to 3s. It was outstanding the market again.

Sir F. DIXON-HARTLAND: The same as with sulphate?

Witness: Yes. In their case it was advanced 2s. in two years; in our case 1s. 4½d. This year there is another advance of 13½d.; last year we only advanced 3d.

Mr. LOWLES: The foresight you exercised they ought to have exercised also?

Witness: Well ——

Were they not taking an even chance?—I do not take any credit for foresight. There was the Welsh strike imminent. Apart from the Welsh strike, it was perfectly clear to anyone who had followed the coal market that an advance was necessary; and to try to get on for 1898 at the price of 1897 was absurd. This made a difference of about £100,000 to them. There is some soreness between the two Companies on this question of coal, because the Gaslight Company insert in their contracts a clause which prevents us in the succeeding year from buying at a lower price than that at which they the preceding year contracted. This clause states that "should the vendor at any time during the term of the agreement deliver into the Port of London, to or for any other Metropolitan Gas Company, any coal of the same description as hereby agreed to be purchased by the Gaslight Company under the price or prices, with or without discount or rebates, agreed on as regards The Gaslight and Coke Company, then the price which the Gaslight Company shall pay for the coal contracted for shall be reduced to the lowest price or prices which the vendor shall agree to accept from any other Company." There are only two other Metropolitan Companies—the Commercial and the South Metropolitan. If there was a rising market, the clause did not affect the Companies; but if coal went down, we could not buy of these contractors at the market price. At first the Company tried to make this apply to the whole twelve months; but the coalowners kicked. Then they tried it for six months; and afterwards it was reduced to three months. The answer of the Gaslight Company was that if the South Metropolitan would run their contracts for the same time as the Gaslight Company, the difficulty would be removed. The South Metropolitan Company said the best time for making contracts was the spring, and they were not going to alter their policy.

Mr. STEADMAN: Is coal cheaper in the spring than in the summer?

Witness: The slackest time is the spring, when the winter demand has gone off and the Baltic is closed. Mr. Jones and I have argued this obnoxious clause with them, and that it is a suicidal policy in the interests of their Company. It tends to prevent the price being reduced. If we can get a reduction in March, what we have done will help them to get a lower price also.

The CHAIRMAN: I understand you refuse to give the Gaslight Company any advantage by taking the coal at a cheaper rate from their contractor, because that would inevitably lower the price to the Gaslight Company.

Witness: Well, I thought it was an unfair clause.

Do I understand you are willing to pay a higher price for your coal than you need do?—No.

Well then where do you get it?—Elsewhere, from other contractors.

Mr. NICOL: It only affects the contractors dealing with both of you?

Witness: That is all.

Further examined by the CHAIRMAN: It would have benefited the Gaslight Company if the South Metropolitan Company had dealt with their contractors at a price lower than that in the Gaslight Company's contract; but witness declined to do so. He had pressed upon the Company that they should drop this clause. It caused the South Metropolitan Company inconvenience, did the Gaslight Company no good, and tended to keep up the price of coal. The Gaslight Company, however, refused.

The CHAIRMAN: Have you anything more to say about coal?

Witness: I want to work on amicable terms; and if we could work on amicable terms, I am sure we should do better all round.

What do you mean precisely by "amicable terms?"—I am quite willing to give them all the information about our coal contracts as we are making them—to tell them at what price we are buying.

Are you willing to make joint contracts with them?—No; we cannot do that.

Why?—We cannot do that. This year, when the price further hardened, I communicated with Mr. Jones and other important Gas Companies, telling them what price we were going to pay, in order that they might not pay more than was absolutely necessary. If the gas companies met in conference, it would be better for them all.

Mr. BALDWIN: And worse for the coalowner?—Well, the coalowner can look after himself.

The CHAIRMAN: Prices may alter between the time of the contracts?—Yes; but take last year. If we had been on terms of friendly conference about the matter, I could have met the Governor of the Gaslight Company, and have given him some information about the market. It would have been wise for them to have gone in with us, and made their contracts two or three months before they usually do—in March, instead of May—and got on at our advance of 3d., instead of over 1s.

Examination resumed: Both Mr. Haward and Mr. Jones assumed that the whole of the South Metropolitan Company's profit-sharing—0·55d. per 1000 cubic feet, or rather more than a halfpenny—was paid for carbonizing wages. As a fact, £20,000 a year—the 0·55d.—was distributed among the whole of the employees, from the Chief Officer (Mr. Bush) to the boys. The carbonizing wages of the South Metropolitan Company were 1·29d. per 1000 cubic feet less than those of the Gaslight Company. Then Mr. Haward said the South Metropolitan Company gave a certain sum—0·55d. for profit-sharing—which would reduce the

1·29d. to 0·74d. He took off the total of the sum absorbed by the profit-sharing; but the proportion of the 0·55d. going to the stokers was only 0·2d., which would make the actual difference of cost between the two Companies 1·09d.

Mr. STEADMAN: You include in that the amount set aside for profit-sharing?

Witness: I do.

You really pay with your profit-sharing system less wages than The Gaslight and Coke Company do?—No; we pay more. We pay the same wages—but perhaps I may state the principle on which we work is that wages are governed by the law of supply and demand. We found last year that the wages we were giving were not high enough to command a sufficient number of stokers. So in September the Board resolved that it would be wise to increase the wages 7½ per cent. Before doing so, we let the two other London Companies know what we were doing. The Gaslight Company did not do that, when they started the eight-hour day the previous year. The result was there was a conference. The South Metropolitan Company said: "We are satisfied that it is necessary and right to increase the wages per day for stokers 7½ per cent.—from 5s. 7d. per day to 6s." We increased the rate, and they followed the week after. Knowing we were going to do it, they should have done it at the same time. As it was, they lost the credit for it. The South Metropolitan Company gave the increase, and then the Secretary of the Gas Workers' Union called a meeting, as a result of which a demand was made on the Gaslight Company, to which they at once acceded. In addition to the 6s., the South Metropolitan pay the profit-sharing, amounting to another 7½ per cent. This year it will be 8¼ per cent.

I want to be clear on this point. I understand you to say The Gaslight and Coke Company are paying their stokers 6s. a day?—Per shift of eight hours.

And beyond that you are giving them profit-sharing?—Yes.

Which they are not doing?—Yes. Paying higher wages, the work costs less—about 1s. a ton less.

The CHAIRMAN: The men, in fact, pay for this privilege of sharing profits?

Witness: No.

Sir F. DIXON-HARTLAND: They do as much as they can to win it?

Witness: Yes. The profit-sharing is simply an extension of the sliding-scale to the workmen. For every reduction of a penny in the price of gas, the employees get 1½ per cent. on their wages or salary.

Mr. COHEN: Will you explain why it costs you less, if you pay more wages?

Witness: Well, I think the Companies that are under the domination of the Unions have to work according to the Union rules. One of the rules of Trade Unions is: One man, one job. A stoker is not fully occupied in his work; he has to work for about three-quarters of an hour out of every two hours. But there are other little jobs—cleaning and oiling, and one thing and another—which he can do. Where the Union rules, they say: "You must employ separate men for all these jobs." Then the Union only allows a given weight of coal to be charged into a retort. Sometimes a retort will take more coal, sometimes less; sometimes you have an inferior fuel, at others you have good fuel; your heats are up, and the retort will take more. The rule is that the man puts in as much as the retort will carbonize; and I am happy to say our men do it, and never raise a question. There is no fixed rule as to what they are to put in. A good deal of the saving is also due to machinery.

The CHAIRMAN: With regard to machinery, have you anything further to say?

Witness: We have more machinery than the Gaslight Company. I do not know how much machinery they have; but they must have a fair quantity, I imagine. A third of the retort-houses at Beckton are fitted with machinery. You may say rather more than half our work is done by machinery or inclined retorts; and they certainly have not so much as that. Then we gain in another way by machinery. A man works a machine for what it is worth. The Socialistic Trade Unions have an idea that the users of machinery are not to get any special advantage out of it—that they are not to save labour in any way by means of it. Where the Unions have power, they restrict in one way or another the amount of work machinery may do. A machine is an expensive thing; and for it to be successful, it must be worked for what it will do. Our machine men believe in doing as much as possible, and we have had to stop them. They have a pride in doing as many retorts as they can. I think we got up to nearly 300 retorts worked by a machine, which is a very large number. We do not allow quite as many as that; about 250 is the number. The machinery we have put in has cost us £52,000; and the inclined retorts have cost us £20,000 more than ordinary settings of retorts would have done.

In further examination, witness explained that gas companies were constantly renewing retorts. Since 1889 (when they had to pay so much extra for labour), machinery had been adopted. The retorts are being renewed in a way adapted for machinery or inclined retorts. In ten years, a great many benches had been pulled down, and new ones put up in the modern style. Witness some time ago made a charge against the Gaslight Company that they were wasting money by not using machinery. In a reply which the Directors of the Company issued, they said that, while they could have saved perhaps £129,000, had they substituted inclined retorts or mechanical apparatus in the whole of their works, to have adopted the system of inclined retorts throughout would have involved an expenditure of £1,000,000 or thereabouts. Well, it cost the South Metropolitan Company, to adapt machinery and inclined retorts to 2000 out of their 3600 retorts—or five-ninths—£70,000. The South Metropolitan was half the size of The Gaslight and Coke Company, so that adapting it to half The Gaslight and Coke Company ought not to have cost more than £200,000. As to the allocation of the expenditure, pulling down and rebuilding retorts on the ordinary system would have cost £50,000; whereas putting in inclined retorts cost £70,000. They charged the difference of £20,000 to capital. When they put in new machinery, they charged the cost to capital. The South Metropolitan Company were required by law to keep their works in repair; and when anything was worn out, they repaired it from revenue. All the small things were done year by year.

Mr. COHEN: The maintenance and the new additions you charge on revenue?

Witness: Yes.

Mr. NICOL: You always keep capital intact?

Witness: Yes; but supposing this machinery should become obsolete and go out of work, we should feel that we must recoup that loss out of revenue, and not let it be a permanent burden on capital.

Which lasts the longer, the inclined retort or the horizontal?—The horizontal, I think. A retort lying flat on its back will, naturally, last longer than one which is inclined.

Are your retorts inclined to such an angle that the coals when put in fall to one end of them?—The first coal falls towards the bottom, and is stopped mechanically; then the coal stops that which follows. We can control the rapidity of the flow of coal into the retort, and prevent its massing at the bottom.

Can you heat an inclined retort as equably as a horizontal one?—Yes. We could not do so at first; but we can now.

As to increase of business in connection with the Gaslight Company, you want to say something?—Yes; the Gaslight Company have suffered greatly through an absence of increase of business. This failure to get increase of business is due partly to the Company's own fault, through their neglecting to cultivate it. In the old days, we all simply sat and waited for business to come to us. Now, however, this policy will not do. We have two competitors to deal with—electric light and mineral oil. We must act like ordinary traders, and try and encourage people to come to us.

The CHAIRMAN: Why did they want so large an increase of capital, if they had no increase of business?

Witness: Well, their ordinary consumption of gas has decreased; but they have made it up by slot meters. They have lost on the one hand, and made it up on the other. The gain by means of slot meters has involved a very heavy expenditure of capital. Each slot meter costs them rather under £9. I had put it at £10; but the Company corrected me. Take 100,000 consumers, and multiply them by £9, and you get £900,000.

You say in your notes of evidence: "The sliding-scale has not had the effect on the Gaslight Company which witness expected"?—Yes. The general effect of the sliding-scale has been to stimulate reduction of price; but when you consider that this price is now 6d. per 1000 cubic feet higher than it was ten years ago, it is evident that the sliding-scale or something else has been wrong. No other gas company in the kingdom has raised its price to anything like this extent. Most of the companies had to raise their price when coal became dear in 1891, 1892, and 1893; but they have nearly all of them gone back again to the old figures.

By raising the price, they have been obliged to lower their dividend?—Yes.

And we may assume they would not have done that unless they had been obliged?—I do not think they would. If the Company had used ordinary common sense in buying coal last year, they would have saved £100,000, which would have been more than a penny per 1000 cubic feet. I do not think the blame lies with the sliding-scale, because the principle of it is identity of interest between consumer and shareholder.

You are in favour of the principle of the sliding-scale, I understand?—Yes; and I think I may say that the sliding-scale has given peace in London. Whereas prior to its introduction in 1875-6, gas agitations were chronic in London (there were seven parliamentary inquiries within twenty years), they then ceased entirely, until the present recrudescence of discontent.

You go on to suggest a remedy. You say in your notes: "What is the remedy? Incomparably the best way out of the difficulty would be for the Directors to frankly admit the impeachment, recommend the shareholders to agree to reduce the dividend to 4 per cent. on the ordinary stock, by taking off the extra 18s. per cent., equivalent to 2¼ per cent. on the old 10 per cent. scale, and undertake to refrain from increasing it again until the price of gas is reduced below 2s. 9d. per 1000 feet"?—The remedy is for The Gaslight and Coke Company to recognize their position. It is a bold thing to do to go to the shareholders and say: "We are in a serious position, and we want your support and sympathy to help us to get out." But they should tell the shareholders how they stand, and recommend a reduction of dividend until the price of gas is brought down to a reasonable figure. If the dividend were somewhat reduced, it would give some satisfaction to the consumers, I am sure. They would say: "The Company having acted in this way, show that they mean business. It shows that they recognize our claim, and are ready to do their best." But I am afraid it is hopeless to expect the Company to take up this position. They will endeavour to prove that it is not themselves who have been to blame, but circumstances over which they have no control. I am a shareholder in the Company; and, as such, I have done all I could. I have pointed out all these things at their various general meetings; but with no result. I maintain that if they did what I recommend, it would be the best way out of the difficulty. I feel convinced that if a proposal were made to the shareholders to reduce their dividend, it would be taken generally as an earnest that the Directors were determined to improve the position of the Company. But I do not believe the Directors see the seriousness of the position.

What do you mean by the "serious position?"—I mean the very high price of gas, the loss of business, and the serious competition of the electric light. The price of gas is very serious compared with the rates charged in other places—even in such small towns as Rochester and Maidstone, where it is less than 2s. 6d. per 1000 cubic feet.

You hold that, in connection with a large concern like this, 3s. is much too high?—I certainly do, looking at what Mr. Jones has been able to do in the case of the Commercial Company, with no suburbs. Wandsworth is selling gas at 2s. 2d.; yet our friends of the Gaslight Company do not see that they are in a bad position. Their high price is damaging to all of us—not only to them, but to all of us.

It damages you and the Commercial Company, as well as themselves?—Yes. It has given an impetus to electric lighting which it otherwise never would have had. That is spreading over all the districts now.

What interest do the Gaslight Company pay?—12¼ per cent.

And you would recommend them to reduce it?—Yes; I would recommend them to reduce it to 10 per cent.

To 4 per cent. according to your notes? That had reference to the converted capital. They are paying £4 18s. on that; and I recommend them to reduce it to £4. In order to lower the price of gas, they should forego a little of their dividend. They have £6,000,000 of ordinary

capital and £3,250,000 of preference stock. The whole burden of the loss would fall on the ordinary shareholders—the preference stock would escape.

You made some observation as to the breach of faith there would be if Parliament interfered with the standard price or dividends?—Yes.

I presume you are still of opinion that Parliament ought not to interfere?—Yes. Parliament ought not to interfere; but I think that Parliament would be justified in saying, when the Company come to them for new capital—and they want new capital now: "We will give it to you, but only on condition that you forego your additional dividend under the sliding-scale, or some part of it, until you have reduced the price of gas (say) to 2s. 9d., or some reasonable amount."

Do you make that suggestion general as to all the Companies, or particularly as to the Gaslight Company?—I make it generally, so that it should apply to ourselves if we were in the same position. An institution like a gas company should justify its existence. We have duties as well as rights. If any institution does not justify its existence, it must come to an end sooner or later.

How does that materially differ from interference with a standard price?—Well, interference with a standard price would be permanent—for ever. I admit that my proposal is equivalent to reducing it for a time. I want to set the shareholders to work. They have heard what I have said; and what is the answer? Why, that they are satisfied. The only way to work on the Company is to bring pressure to bear through the shareholders. If Parliament said: "We will stop your extra dividend until you have put your house in order," the shareholders would put pressure on the Directors.

You say this with regard to new capital?—I say the existing initial price ought not to be altered, but that on application for new capital a lower standard should be temporarily fixed.

That was not the recommendation you made just now?—No; I want them to do this voluntarily. If they do not; then Parliament should put pressure on them, saying: "We are not satisfied at the way you have done your duty, therefore we will suspend the operation of the sliding-scale till you have done what you ought."

If it is improper to charge so much, why do they put the standard so high?—It was not high when it was fixed. At that time the Company were charging 3s. 9d.; and Parliament made that the standard price.

You think Parliament should, as a temporary measure, reduce the standard price over the whole of the capital, and in future reduce it over any new capital?—They should reduce the price on new capital, but not on the old. I would rather say that the sliding-scale should be held in abeyance.

We understand that you give in your notes the opinion that you have not much faith in the Company adopting your recommendation?—I have not much faith in their doing so. They say in the book I have here, in effect, that they intend to continue on the old system. If they would recognize that the Company are in a bad way, and make up their minds to improve it, things would look better. If a man like Mr. Jones had been at the head of affairs, the charge of the Gaslight Company would have been lower.

Would 2s. 8d. have been the lowest they could have reached?—I do not think they could now come lower than 6d. above the South Metropolitan price.

This concluded the evidence-in-chief of the witness. Before submitting to cross-examination, he handed in the following statement:—

STATEMENT *showing the respective Capitals Paid Up, and other Particulars of The Gaslight and Coke Company and the several Companies amalgamated therewith.* (*The figures are those of the 31st of December of the year prior to an amalgamation.*)

Year.	Company.	Capital. Paid Up.	Capital. Rate per Million Cubic Feet Sold.	Price of Gas per 1000 Cubic Feet.	Deficiency or Surplus Profit.	Price Required to Pay Maximum Dividends.
1869	Gaslight	£1,304,036	£1012	4s. 0d.	*Deficiency* £26,446 = 4·93d. per 1000 feet.	4s. 4·9d. Gaslight.
	City of London	456,825	854	4s. 0d.	*Deficiency* 838 = 0·38d. ,,	4s. 0·4d. City of London.
	Great Central	266,000	571	4s. 0d.	Surplus 13,808 = 7·11d. ,,	3s. 4·9d. Great Central (reduction imminent).
1870	Gaslight	£2,316,877	£979	3s. 9d.	*Deficiency* £25,600 = 2·61d. per 1000 feet.	3s. 11·6d. Gaslight.
	Equitable	300,000	671	3s. 9d.	Surplus 8,995 = 4·82d. ,,	3s. 4·2d. Equitable (reduction announced).
1871	Gaslight	£2,892,408	£908	Cannel gas 5s. 3d.	Surplus £6,008 = 0·45d. per 1000 feet.	5s. 2·5d. Gaslight (cannel gas).
	Western	414,500	700	,, 5s. 0d.	Surplus 8,402 = 3·41d. ,,	4s. 8·6d. Western (cannel gas).
1875	Gaslight	£4,163,498	£904	Common gas 3s. 9d.	*Deficiency* £42,431 = 2·21d. per 1000 feet.	3s. 11·2d. Gaslight.
	Imperial	3,352,182	887	3s. 9d.	Surplus 7,675 = 0·49d. ,,	3s. 8·5d. Imperial.
	Independent	255,000	466	3s. 6d.	Surplus 13,455 = 5·92d. ,,	3s. 0·1d. Independent (reduction imminent).
1882	Gaslight	£9,656,147	£762	3s. 2d.	*Deficiency* £18,516 = 0·35d. per 1000 feet.	3s. 2·3d. Gaslight.
	London	898,891	566	3s. 0d.	Surplus 10,482 = 1·59d. ,,	2s. 10·4d. London.

This table shows that every one of the Companies amalgamated was in a better position than the Gaslight Company.

The capital per million cubic feet sold was very much lower in every case but the Imperial, which was only slightly lower.

The Gaslight Company in four out of the five years had a deficiency—that is, not sufficient profit to pay the dividend; whereas only one of the Amalgamated Companies (the City) had a slight deficiency, and nearly all the others had considerable surpluses.

Mr. DIXON-HARTLAND: What would the saving be if the southern part of the undertaking of the Gaslight Company were handed over to the South Metropolitan Company?

Witness: The northern part of their undertaking would gain 1d. per 1000 cubic feet, or £70,000 a year.

What difference would that make in the cost to the northern part—to what extent would they have to reduce the dividend if this £70,000 were taken away?—A quarter per cent. increase in dividend is allowed for a reduction of 1d. in the price.

They asked for £3,500,000 of new capital?—Yes; and they have got £2,500,000. They want a certain amount of money for gasholders and slot meters. The £2,500,000 would be debenture stock.

And dividend would be paid on it?—Yes.

It will reduce the amount to be paid on the ordinary stock?—They will only raise that as they require it. My contention is that new capital ought only to be raised concurrently with new business which will more than pay the interest on it.

If the concern is so badly managed, how are we to know that the new capital will be better employed than the old has been?—They say: "We will spend this money more economically than we have spent the other."

If that is so, why cannot they show more economy in working what they have got?—The capital they had is gone.

What I understand you to say is this: Supposing they carry out a proper system of purchasing their coal and selling their residuals, and have proper machinery, and get the good will of their workmen by profit-sharing, they could sufficiently reduce their charges?—Yes; I think they might. But may I make one other suggestion—namely, that they are in exceedingly bad odour with the public.

I know that?—What they should strive to do is to convince the public that they intend to do better; and I think they could best do this by giving up a certain part of their dividend. It would take time to bring about a satisfactory state of things by the process to which you refer.

Is gas cheaper than the electric light?—Yes; electricity costs more than 3s. for the equivalent to 1000 cubic feet of gas.

Would you be surprised to hear that my electric light costs less than the amount I used to pay the Gas Company?—Yes; I should be surprised to hear that.

Well, that is the fact. I get the electric light for less, and my neighbours do the same. I will give you the facts and figures at any time, if you wish to go into them?—Thank you. My comment on that is that it emphasizes in the strongest way my contention as to the necessity of keeping down the price of gas.

Mr. BALDWIN: I gather that you think all this is a question of management?

Witness: Yes.

Can you suggest a method by which Parliament could interfere in the management of the Gaslight Company?—No; I do not think Parliament should interfere. The matter is one for the shareholders alone.

You can suggest nothing as to the interference of Parliament with the management?—No; I think it would be wrong. All I would say is that when the Company come to Parliament, Parliament should say: "You must put your house in order, or else we will not give you the money powers you seek."

Mr. LOWLES: As to public lamps, do you charge the same as to private consumers?

Witness: Yes, with 5 per cent. discount for prompt payment.

Could you go to the City?—It would be almost impossible. It would involve frightful inconvenience to the public in the laying of pipes, and so forth.

By Mr. NICOL: He agreed with Mr. Haward that if the Committee were satisfied that the management of the Gaslight Company was defective, and submitted to the House a report embodying that view, it would have the best effect on the shareholders.

Mr. STEADMAN: Are you aware that one of the coal contractors is a member of the Board of Directors of the Gaslight Company?

Witness: No; but I may say that the coal contractors have always treated us as the gentlemen they are. I have always found them gentlemen and honourable men.

And you are not aware that one of them is a member of this Board of Directors?—No; I am not.

You referred to Trade Unions and their action as to the limitation of the output. May I ask what your hours of labour are for stokers—on an average in the week?—We have the three-shift system at two of our largest works—that is to say, the eight-hour system. At another of our largest works we have the two-shift system, or eleven hours. At one small works we have the two-shift system; and at another we have a two-shift system in winter, and a three-shift system in the summer. The men are allowed to choose which they like.

The Gaslight and Coke Company have the eight-hour system?—Yes. When the men work on the longer shifts, the Company save no money. We pay in proportion to the work done; and the men like the longer shift. Many choose it in order to get the higher pay.

In regard to the limitation of output, have the Gas Workers' Union in their rules got a limitation?—No; they are too wise to put it in their rules.

Where do you get your information?—Well, they were restricting us in every way. I was charged with desiring to smash the Union. The men said they would not oil the levers of the retorts. It was not a very arduous or time occupying task; but the Union argued it was not a part of the duty of the stokers, and the men said: "We are told not to do it." I said: "If your Union is conducted in that way, it will not last twelve months;" and from that the report got abroad—"Livesey says he will smash the Union."

But you said the Union limited the number of shovelfuls of coal the men should put in the retorts?—They did. They do not now; but they did.

It is not in their rules?—No.

Then where do you get your evidence from?

The CHAIRMAN: I do not think we should go too far into this.

Mr. STEADMAN: Mr. Livesey raised the question; but I am quite in your hands.

Witness: I hear things from other gas managers. They tell me that representatives of the Union come to them, and say: "The stokers ought not to do this or that."

In reference to machinery, have you introduced the automatic stoker to any extent?—Not the automatic stoker. They are worked by men, compressed air, wire rope, and hydraulic power.

Mr. COHEN: In your opinion, all the causes to which you have referred as contributing to the high price of gas in the area of the Gaslight Company are causes within the control of the Company.

Witness: I think that with efficient management, such as we find at work all over the country, the Company could have overcome the difficulty. The price of gas could be reduced if the Company recognized their position. I do not think they could get lower than 2s. 9d. for some time to come.

Supposing The Gaslight and Coke Company had not amalgamated with several small Companies (supposing their separate existence had been perpetuated), that would have been to the advantage of the consumers, would it not?—It would have depended on the management. The smallest Company of all did not raise their price during the coal famine of 1872-73. I believe the London Company, if it had continued until to-day, would have been selling gas as cheaply as the Commercial Company, at the very least.

Then the north of the Thames has suffered by the amalgamation?—Yes; I think so.

Further examined by Mr. COHEN: In Mr. Phillips's time, the purchase of coal was managed quite as well as anyone could have done it.

Sir F. DIXON-HARTLAND: You said you were in favour of a certain practice—selling what is produced when it is produced, and buying what is required when it is required.

Witness: Yes.

That principle, I suppose, you are in favour of because your experience tells you it has been, on balance, the most advantageous way?—Yes. Well, I have had to buy practically all the coal for the South Metropolitan Company for the last thirty years; and I am sure the best you can do in buying coal or selling coke is to buy or sell at the market price of the day, and not make long contracts.

You told us that The Gaslight and Coke Company have a clause in their contract providing that should the prices of coal supplied by their contractors to the South Metropolitan Company be reduced, they will be equally reduced to The Gaslight and Coke Company. Did the South Metropolitan Company ever insert such a clause?—We did this only once. There was a combination of coalowners in 1893 or 1894, and they put up the price to 7s. a ton. These gentlemen came to see the Board of the South Metropolitan Company; and at the meeting they agreed to sell at 7s. a ton. We said: "You have made your bargain with us first; we shall not like it if you go to The Gaslight and Coke Company, and sell at a lower figure. We shall not be at all pleased if you sell at 6s. 10d. to them immediately after." They replied: "Certainly not; we should not think of doing such a thing."

Although you did not insert it in the contract, there was the understanding that they should do it?—But you see it was immediately following; it was not for the succeeding year. If The Gaslight and Coke Company were to say: "You shall not sell to any other Company during the current contracting season at the same price," I should not object. But they sought to get it for too long a period. I am not sure that they have the clause in this year; but I have not heard that they have given it up.

Now I am coming to what is most important to us. You agree that Parliament could not, and should not, interfere with the management of a company?—Quite.

Nevertheless, you think Parliament could refuse—and in your opinion should refuse—the right of capital powers for this Company, unless they improve their management. Is this not in conflict with your previous statement?—The Company would then have the option of saying: "We will go on without these capital powers." If anything of that sort were applied to my Company, the probability is we would say: "We will not take it; we will struggle on another year without it." But we should add that, Parliament having said this to us, we must take care that when we come next year we shall be in a different position.

But you also told us you did not think the Company ought to have parliamentary powers unless their business necessitates these powers?—I am afraid their business does necessitate it. They have enough for this year; but I do not know about after that.

Then if they require the capital, Parliament ought not to refuse the powers, according to your showing?—Parliament says: "We are not satisfied with the manner in which you have conducted your business. You have come to us for a certain favour or privilege. We admit that it is necessary sooner or later—but go back for another year."

Can you say, in your judgment, Parliament has not to examine and criticize the way they do their business?—I think Parliament has the right to criticize and examine, but not to interfere.

Then the remedy to be sought, in your opinion, is by reporting, should we be satisfied that these allegations are established, in conformity; and in this way bring to the knowledge of the shareholders something which at present possibly they do not know?—Yes.

And you say that is all Parliament should or could do?—Yes.

In further examination, witness said, in reference to slot meters, that one reason why it cost the South Metropolitan Company £6 10s., and The Gaslight and Coke Company £9 each to fix them, was that the latter Company fixed 5-light meters, whereas those of the South Metropolitan Company were only 3-light. It had been said that the 3-light meter acted detrimentally to the small consumer, because if it was worked beyond its power, it registered against him. This charge being brought, witness had a number of tests made, and found that in every case in which it was worked in excess of its capacity, it registered, on the average, ½ per cent. against the Company, not against the consumer.

The next witness was

Mr. JOHN WILLIAM FIELD.

He said he had been in the service of The Gaslight and Coke Company for twenty-six years; the last six years as Secretary and General Manager, and for twenty years previously as Chief Accountant. He wished to explain, in opening, a discrepancy which Mr. Livesey found between his (witness's) evidence this session regarding the Bill of The Gaslight and Coke Company, and a statement in a circular-letter sent out to the Company's shareholders in 1894. There was a difference between the figures, but not so great as Mr. Livesey stated. The figure in the circular was £1,800,000, and represented the estimated excess of expenditure incurred by the Company in consequence of the different character of the supply of gas north of the Thames as compared with the south. The difference in the circular was ascribed to one matter only—the specially large day's maximum delivery of gas which the Gaslight Company had to provide; but it was due to others also. Before the Committee, £400,000 was quoted as representing the extra amount of capital necessary in connection with the maximum day's supply; but a further answer of witness gave the figure of a million or a million-and-a-quarter. The two things were in connection with the difference in the characters of the districts of supply—one the larger maximum day's delivery, and the other the small rate of increase of business—both of which tended to enhance the capital expenditure. The figure of £1,250,000 he would explain later on.

The CHAIRMAN said he did not understand the reply of the witness before Sir William Coddington's Committee to the effect that if the Gaslight Company had the same annual rate of increase as the South Metropolitan Company, they would have had to construct very much larger works than had been the case—more modern and cheaply constructed works than they had now—and that they would have saved a million or a million-and-a-quarter of capital.

Witness replied that this was so, because new works could be constructed at verymuch smaller capital expenditure per million cubic feet than original works. Mr. Hunt and Mr. Jones gave evidence to this effect.

Any increase of business can be met more cheaply than in the past?—Yes. A Company with increased business of some 200 per cent. will be at very much greater advantage than one with an increase of 50 or 100 per cent., because a very much larger proportion of their works will be modern and cheap; and the effect of that is very striking indeed upon the general working of the Company.

But you have not yet explained how you come by the figure of £1,800,000?—That was to cover the whole of the differences between the two Company's districts. It is unfortunately expressed there. But the two figures we shall prove to-day are in place of the £1,800,000.

Do you now say that the extra capital you require to enable you to meet what you call the additional maximum day's output is £400,000?—We adopt £400,000 as a very low figure. We are prepared to take the lowest figure. The £1,800,000 is certainly not in connection with that one item alone; it must be taken as covering both items. I do not propose to occupy time by anything in the shape of repetition of evidence as regards legislation prior to 1876. I shall confine myself as far as possible to what the powers of the Gas Companies—and of this Company especially—are and to how we have exercised them. While I realize the fact that I am to reply to the charges which have been brought against the Company during the past several days, I am met at the outset with one great difficulty, which is that although you have had many statements laid before you dealing with the various matters—such as working expenses — you have scarcely had, throughout the whole of the inquiry, any definite charge. Until Mr. Livesey came into the box—and I do not propose to deal with his evidence to-day—we have had no definite charge against the Company of mismanagement, or neglect, or extravagance. You have had a great many general statements; but not a single contract which the Company have made in the past five years has been challenged. With the exception of one item alone—the gasholders at Beckton—no item of capital account has been definitely remarked as extravagant. The whole of the powers of which we have to give an account to-day were granted by the Company's Act of 1876. Our initial price is 3s. 9d. per 1000 cubic feet for 16-candle gas; and attached to it is the sliding-scale. There was some doubt as to the meaning of the words in our sliding-scale clause "in any year;" and this was cleared up in the Company's Act of last year, by a provision to the effect that the maximum price charged by the Company in any year or part of a year should be the governing price in relation to dividend for the whole of that year. The sliding-scale came into operation in 1877; since when the price of gas has been reduced from 3s. 9d. to 2s. 6d. It is now 3s.—a reduction of 9d. The dividend has fluctuated in precisely the same way between 10 and 13¾ per cent.; the present rate being 12¼ per cent. Added to the sliding-scale, were the auction clauses, the object of which is the raising of capital at the lowest possible rate. The Directors voluntarily applied these clauses to the debenture stock; and all the stock raised since 1884 has been put up to auction or sold by tender—the result being that we have had premiums of £310,000 in respect of the loan capital, in addition to what was obtained on the ordinary share capital.

Did you propose that in Parliament?—We proposed that ourselves; and in our Bill before the House for debenture stock, we ask to be allowed to dispose of it in the same way—that is, by public auction.

Have you made any effort in the direction pointed out by Mr. Livesey to try and get your consumers to be participators in your stock?—No; we have not done so. We have kept, as regards auction clauses, within the strict letter of the law; and we rather deprecate any departure from

the system of auction or tender and the regulations as to advertising which are laid down in the Act. I do not want to use the word offensively; but it appears to me that advertising in papers which do not come before the notice of the ordinary investor, is scarcely carrying out the intention of the Legislature, which was certainly that the widest publicity should be given as to the intention of the Company to issue stock. I rather think that if once we depart from the observance of the strict letter of the law there, we might be tempted to do a little jobbing in that way. It is open to the greatest objection if we are allowed, in order to secure an allotment to a certain class of investors, to advertise in such a very limited way as that. It does, I think, put it in the power of the officers of the Company to fix such a minimum price as would enable them or their friends to come in at something below the market price, and so evade the intention of the Act. I think the more publicity you give to matters of this kind the better.

Have you found you have always managed to dispose of your stock offered by auction?—Or by tender. Sometimes we have not succeeded; we have fixed the price apparently a little too high. We have kept the stock back, and watched our opportunity of issuing at some future time at a higher or lower price according to the market. I want to add one piece of evidence as regards the question of alleged interference with the initial or standard price of gas. I hope I can show the Committee that any alteration in the initial price of gas, or any fixing of an unduly low initial price, does not redound to the advantage of the public, because, if the initial price is low, the dividend payable on the stock will be proportionately low, and therefore the amount of the premium realized from the sale of the stock will be also low. We all know that the premium on stock issued bears no dividend at all; and therefore the larger the amount of the premium realized, the cheaper you raise your capital. If you look to the table, you will see examples of the working of the sliding-scale clauses in conjunction with the auction clauses, with four initial prices:—

	A.	B.	C.	D.
Initial price. . . .	3s.	4s.	5s.	6s.
Standard dividend. .	10 per cent.	10 per cent.	10 per cent.	10 per cent.
Selling price of gas .	2s. 6d.	4s. 0d.	2s. 6d.	5s. 0d.
Dividend payable under sliding-scale. .	11½ per cent.	10 per cent.	17½ per cent.	13 per cent.
Nominal capital raised	£87,000	£100,000	£57,150	£76,900
Price realized for stock	£230	£200	£350	£260
Capital raised (including premium) . .	£200,000	£200,000	£200,000	£200,000
Gas sold (*thousands*) .	400,000	400,000	400,000	400,000
Average return on capital raised . .	5 per cent.	5 per cent.	5 per cent.	5 per cent.
Capital employed per 1000 cubic feet . .	10s.	10s.	10s.	10s.
Charge for capital per 1000 cubic feet . .	6d.	6d.	6d.	6d.

The table meant that, assuming they had the same standard dividend and varying selling prices of gas, inasmuch as gas stocks were thrown on the market to pay a certain rate of interest, the charge for capital per 1000 cubic feet was in every case precisely the same. Providing they had the sliding-scale and auction clauses, the consumer was neither damaged nor benefited by a high or low initial price.

The CHAIRMAN: That is as far as capital only goes?

Witness: Yes.

That does not bear upon the working?—No. I only say the cheapness of raising capital is not influenced by the initial price. The other provision, which is a special one, which governs the price of this Company is that shown in the 39th section of the amalgamation scheme with the London Company, under which the Company are precluded from charging a higher price south of the Thames than the South Metropolitan Company, for the time being, are charging.

Do you consider that a fair and just arrangement?—We quite accept it.

Have you anything to say with regard to what has been asserted—that the low price in the south requires you to raise the price to the consumers in the north?—I shall deal with that very fully as I go on.

In further examination, witness said the other power of charge of the Company to which he wished to direct attention was that as to meter-rentals, the amount of revenue from which source was £58,000, which equalled ¾d. per 1000 cubic feet. In 1894, slight objection was taken on the part of the public to meter-rents, and there was correspondence in the papers regarding it. The Gaslight and Coke Company were specially restricted as regarded the City of London, where they were precluded from charging meter-rents. It happened frequently that a man in the City had a shop or warehouse where he paid no meter-rent; and he rather resented having to pay such a charge (say) in Paddington. Therefore in the latter end of 1894 the Directors decided to abolish these rents altogether, rather than make a further reduction in the price of gas. In that year, they had made two reductions—one of 1d. and another of 2d., which gave the shareholders an extra ¾ per cent. of dividend. If the Directors had adopted the usual course, and still further reduced the price of gas (instead of abolishing meter-rents), the shareholders would have been entitled to a full 1 per cent. extra dividend. The extra ¼ per cent.—about £14,000—had been saved to the public, he hoped for all time.

The CHAIRMAN: How was that an advantage to the consumer?

Witness: Because we saved the ¼ per cent. dividend, which amounts to something like £14,000 a year, which would have attached to the further reduction of price.

I do not see how that is an advantage to the consumer. It is a disadvantage. But the £14,000 became further available for reduction of price.

Mr. COHEN: If it was so applied.

The CHAIRMAN: If it was so applied; but you said you did not reduce the price.

Witness: We reduced it 3d., and gave the consumers this.

If they got it, it was an advantage?—Anyhow, it went towards the fund which was available for the payment of dividend. They got it in the abolition of meter-rents, carrying with it no increase of dividend.

I must say the advantage to the consumer is only proved when they got the reduction of price, which you do not say, at the moment, they got?—No. The Committee will see therefore that before they can compare the prices charged by this Company with those charged by other Companies, they have to take in four items—the price of gas charged to consumers in the north, the price charged to consumers in the south, the charge for public lamps north and south, and the abolition of meter-rents. The true measure of charge in all cases, whether in this Company or in any other Company, is the average of the charges obtained by the Company per 1000 cubic feet sold—the average price obtained, including all charges. It will not do to take simply the maximum charges. The fair thing is to take the average price per 1000 cubic feet, including all charges which the Company receive, and not deal exclusively with the maximum price charged.

Mr. COHEN: Is it not fair to compare like with like—the price to the consumer in the north and the price to the consumer in the south?

Witness: Not in this way. The differential price in the north and south is an obligation placed on us by the Board of Trade. Therefore, if the Board of Trade have seen fit to allocate one price to the people in the south, and another price to the people in the north, The Gaslight and Coke Company ought not to be debited with charging the full price.

Mr. COHEN asked whether the meter-rent was not an element to be borne in mind.

Witness said it was in all cases. He desired to put in the following table bearing on the point:—

Increase or Decrease in Charges for Net Gas and Meter Rental per 1000 *Cubic Feet, and Increase or Decrease per Cent. in Gas Sold, by the three Metropolitan Gas Companies (as now constituted)*, 1876-1898.

Year.	The Gas Light and Coke Company.			South Metropolitan Company.			Commercial Company.		
	Net Gas and Meter Rental.		Increase or Decrease per Cent. in Gas Sold.	Net Gas and Meter Rental.		Increase or Decrease per Cent. in Gas Sold.	Net Gas and Meter Rental.		Increase or Decrease per Cent. in Gas Sold.
	Per Thousand.	Increase or Decrease.		Per Thousand.	Increase or Decrease.		Per Thousand.	Increase or Decrease.	
	s. d.	d.	Per Cent.	s. d.	d.	Per Cent.	s. d.	d.	Per Cent.
1876	3 9·76	..	..	3 5·26	..	..	3 8·94	..	..
1877	3 7·20	2·56*	4·83	3 5·53	0·27	5·91	3 7·38	1·56	5·05
1878	3 6·90	0·30	7·19	3 3·88	1·65	7·37	3 5·86	1·52	7·99
1879	3 6·70	0·20	8·00	3 3·16	0·72	8·55	3 4·73	1·13	9·29
1880	3 4·94	1·76	2·15	3 1·45	1·71	3·80	3 3·73	1·00	3·87
1881	3 2·88	2·06	4·37	2 10·64	2·81	3·17	3 0·68	3.05	4·64
1882	3 2·86	0·02	4·25	2 10·49	0·15	4·37	2 11·58	1·10	3·95
1883	3 2·62	0·24	3·87	Say 2 10·48	0·01	4·19	2 10·61	0·94	2·37
1884	3 0·70	1·92	2·88	Say 2 8·49	1·99	6·71	Say 2 8·69	1·95	2·64
1885	3 0·60	0·10	4·06	Say 2 8·44	0·05	5·41	Say 2 8·71	0·02	4·86
1886	3 0·51	0·09	2·56	Say 2 6·43	2·01	6·60	Say 2 7·34	1·37	0·37
1887	3 0·36	0·15	3·14	2 5·68	0·80	5·62	2 6·67	0·67	2·55
1888	2 9·39	2·97	2·98	2 5·38	0·25	4·99	2 6·56	0·11	5·48
1889	2 6·61	2·78	4·73	2 3·39	1·99	1·56	2 5·07	1·49	1·93
1890	2 8·07	1·46	2·38	2 3·37	0·02	5·37	2 4·49	0·58	2·67
1891	2 9·52	1·45	3·76	2 4·27	0·90	8·36	2 4·46	0·03	6·14
1892	3 1·07	3·55	0·60	2 6·15	1·88	2·58	2 6·70	2·24	0·72
1893	3 6·82	0·25	4·57	2 5·46	0·69	0·78	2 9·23	2·53	4·01
1894	2 11·77	1·05	0·01	2 4·66	0·80	6·56	2 7·41	1·82	1·86
1895	2 9·35	2·42	5·77	2 3·98	0·68	10·30	2 6·50	0·91	4·56
1896	2 9·34	0·01	4·25	2 3·58	0·40	6·04	2 6·61	0·11	3·39
1897	2 9·34	..	4·51	2 3·59	0·01	8·12	2 6·70	0·09	8·09
1898	2 10·62	1·23	0·22	2 3·24	0·35	4·84	2 6·74	0·04	2·55
1898 over 1876	..	11·14	98·3	..	14·02	218·7	..	14·20	116·4

* Figures of this character represent decreases.

In all his cases he should deal with averages, and not with maximum figures. As to the sliding-scale, about which so much had been said, witness would reply to the objections raised to the principle. Mr. Haward said he rather approved of the revision clauses of the Act of 1868. The revision was to be applied after the Companies obtained such a price as would enable them to pay their full dividends. The Metropolitan Board of Works and the Corporation of London were dissatisfied to find that the clauses operated both ways; and they denounced them vigorously. Mr. Haward said that though the Revision Commissioners had stated that they could not award the Company such a sum as would cover £2500 in respect of a defalcation which had been revealed, yet they had paid it off out of their own pockets. They had done so because of the obligations laid on them by the Amalgamation Scheme. So long as they had amounts divisible for profits, they were obliged to set aside this £2500; and it had never been intended that it should come out of the amount of dividends actually paid. It was to be charged against the profit and loss account before the dividend was paid; so that the course they adopted was strictly in accordance with their Act. The settlement arrived at in 1875-76 was a settlement between the Companies and the Local Authorities—that was to say, the Metropolitan Board of Works and the Corporation—and the Board of Trade; the latter acting as Arbitrator between the two parties. So much did the Metropolitan Board of Works and the Corporation in 1876 approve of the scheme submitted to Parliament, that they prayed the House of Lords when the matter was before them not to reject the measure, believing that if they did it would be a public calamity.

The CHAIRMAN: You do not think it advisable to suggest any alteration in the sliding-scale?

Witness replied that he did not. He went on to say that Mr. Haward further stated that the sliding-scale left the consumer absolutely at the mercy of the Company. Witness could not understand how Mr. Haward made this out. That gentleman had given the most unfortunate illustration that he could have selected. He had referred to the increased price of gas announced by the Gaslight Company in February, 1898, and had said that the shareholders had agreed to it without demur. This was quite true. The shareholders had not complained, because they felt that the thing was inevitable. It meant a loss of dividend; but the shareholders could not object to it in the interests of the Company. Mr. Haward had said that the loss was so small that the shareholders

did not think it worth their while to object. But what had the reduction meant? On the £6,000,000 of capital, the cost of the reduction to the shareholders was £8 per cent., so that the amount—in addition to the annual loss and depreciation in value—was £408,000. Another matter in connection with the sliding-scale had been referred to in one or two cases; and he must say something about it. Mr. Haward neglected altogether the advantage the consumer had derived from it, when he said that the Metropolitan Gas Companies had distributed since 1876 £3,000,000 in excess of the standard dividends. The reduction in the price of gas during this period had amounted in the aggregate to between £18,000,000 and £19,000,000. Witness did not for a moment mean to say that the whole of this was attributable to the working of the sliding-scale. A view of that kind would be too extravagant; but he wanted the Committee fully to appreciate that the relative advantage to the consumer and shareholder was not the small insignificant thing which Mr. Haward had represented it to be. Asked whether he agreed with Mr. Livesey in his view of the matter, witness said Mr. Livesey went a little beyond him. Mr. Livesey had rather earmarked the £3,000,000 as being applicable to the effect of the sliding-scale; and he (witness) could not go so far as that. The reductions would have taken place without the sliding-scale; therefore it would be idle to say that the £18,000,000 or £19,000,000 was the result of it.

The CHAIRMAN: He says it would not have gone into the consumers' pockets?

Witness: Not all of it. Gas Companies are blamed for the price of gas being so high, and the consumers getting no relief at all; but I have taken out the figures as to the relief which the Gas Companies have given the public, and that which the Local Authorities have given in local taxation during the same period.

Then you regard the price of gas in the light of local taxation?—No. I show what we have done in connection with our rates in comparison with what the Local Authorities have done.

That is another inquiry altogether. I do not think the two things are at all comparable. In your notes of evidence, you say: "The views of Lord Salisbury and Mr. Bryce on the settlement of 1876." What have you to say as to their views?—Well, I do not think that it is worth going into. It has been dealt with so much. They both said that when once a settlement of this kind had been arrived at, there should be no interference with it.

Questioned as to the amalgamations, witness said that all he had to remark was that before they were adopted and sanctioned, the Local Authorities (including the Metropolitan Board of Works) had the matter referred to them; and their views and objections had been considered by the Board of Trade. He failed to see what objection the Local Authorities could now raise to them. Mr. Haward had said that the anticipation the Company had entertained as to the result of their amalgamations had been disappointed; but it was quite clear that the amalgamation of different Companies could not affect the working of those Companies in the matter of the manufacture of gas. If a station of a Company was badly situated, either in regard to obtaining coal or the sale of products, the fact of amalgamation in no way affected the character of the works. The cost of management would be proportionately reduced.

The CHAIRMAN: Proportionately?

Witness: Yes.

That is not what is generally thought. It is believed, as a rule, that if Companies are amalgamated the cost is not proportionately increased to the size of the new Company formed?—A large proportion of the charges have still to be maintained. You save in regard to the Board of Directors, and in regard to chief officers; but as to clerks and collectors, they are not affected. You want as many clerks and collectors as you did before. One great advantage attendant upon these amalgamations is that all the Gas Companies in London have now been brought under one legislation, and under the Board of Trade. Prior to the amalgamations, each Company had its own ruling power—its own degree of purity of gas, and conditions of that sort. Amalgamation has brought about uniformity in this matter.

Do I understand you to say, looking at a large Company, with large capital and a large area, and with a large consumption, that it cannot be carried on cheaper in proportion than a small Company?—So long as you carry on the same works which the Amalgamated Companies carried on, the cost of the works will be about the same. You find that in the case of the Western Gas Company, whose works were at Kensal Green. No amalgamation in the case of that Company could affect the cost of the cartage of coal, so long as the old works are continued.

Mr. COHEN: You say the amalgamations brought all the Companies under the Board of Trade. Were not the separate Companies under the Board of Trade?

Witness: No. The Act of 1868 was the first that placed them under it. We got the very fine north-western district to supply when we amalgamated with the Western. The consumers under the Act of 1868 got the benefit of that and of the Act of 1875.

Were these Companies in a more profitable position than the Gaslight Company?—The increase in the sale of gas in the case of the Western Company was greatly in excess of that of the Gaslight Company.

Mr. NICOL: Do you consider it was a financial benefit to The Gaslight and Coke Company, this amalgamation?

Witness: Yes.

Do you accept Mr. Livesey's figures?—No; but speaking generally, there was an advantage. We had a larger area to supply.

But were not the Companies who were merged with you in a more profitable position than you were?—The figures do not show the exact facts of the case. Some of them were selling 14-candle gas; and directly they came under our wing, they had to sell 16-candle gas, tested like all other gas. The gas had to be of greater purity.

I suppose all conditions were more rigid in favour of the consumer than they were before?—Yes; and all the Companies came under the purview of the Board of Trade.

Therefore the amalgamations were for the benefit of the consumer?—There is no doubt about it.

It cost you more to supply the gas to the public under the regulations laid down after amalgamation?—Yes. If these Companies had not amalgamated with us, and had gone to Parliament for additional powers, Parliament would have imposed on them our restrictions; and these restrictions would doubtless have enhanced the price of gas.

In further examination, witness stated that 1869 was a very unfortunate time, because the Company were spending money at Beckton and getting no return for it. In 1875, the Imperial amalgamation took place. Just prior to the amalgamation, the Imperial Company had embarked upon the erection of new works. They had purchased a small piece of land at Bromley; and when they came over to The Gaslight and Coke Company, they had a very large capital per ton—almost as large as, or larger than, The Gaslight and Coke Company's capital. The Independent was a very much smaller Company, with very low capital.

The CHAIRMAN: The amalgamation was expected to give, and resulted in, great advantage to the consumers?

Witness: It has. I think uniformity alone is worth having. I think there is a saving too.

What was it induced these other Companies, if they were free from many of the restrictions you had at the time, to join with you?—I suppose the answer would be that they were coming to the end of their capital powers, and that they did not care to face Parliament by themselves, because they knew that if they went to Parliament they would not get such very good terms as we were able to give them. We gave a great many of them 10 per cent. dividend. This sounds rather an extravagant statement; but it has been a great boon to the consumer in this way: They were entitled to divide on the old capital 12, 13, or 14 per cent. dividend; whereas now it is limited to 10 per cent. Therefore to that extent those 10 per cent. preferences have been to the advantage of the consumer.

The Committee then adjourned; the witness being still under examination.

Friday, June 16.

On the resumption of the inquiry to-day, further evidence was given by

Mr. JOHN W. FIELD.

In answer to the CHAIRMAN, he referred to the saving of £14,000 which he held had been effected for consumers by means of the abolition of meter-rents. He emphasized the fact that the money had gone towards the sum available for dividend, and said that had they not saved this £14,000 in previous years, the increase in price of 2d. on April 1 of last year would have been antedated to Jan. 1.

The CHAIRMAN: It went towards postponing the increase?

Witness: Yes. Continuing, he referred to the arrangement of 10 per cent. preference dividends made by the Gaslight Company with some of the Companies they had absorbed. This arrangement had effected an annual saving of £33,000 a year; for the sum would otherwise have gone in paying sliding-scale dividends.

That was, of course, before the auction clauses came into operation?—Quite. But since the auction clauses the Board of Trade have allowed us the 10 per cent. preference stock arrangement in the case of the London Company. If the stock of that Company had come in, and taken "pot luck" with the other stock of the Gaslight Company, it would have been entitled to higher dividends than 10 per cent.—those paid by the Company. Mr. Haward stated that when the Gaslight Company amalgamated with the Independent Company in 1876, their price was 3s. 6d., and that the price was at once raised to 3s. 9d. The fact was that, by agreement with the Board of Trade, they maintained two prices—one 3s. 9d., for the Gaslight Company's area, and the other 3s. 6d., for the Independent Company's area—for the whole of 1876; and in 1877 the price was reduced to 3s. 6d. throughout the whole of the district. The result of these amalgamations had been uniformity in parliamentary obligations together with reduction in management expenses. When he came to deal with Mr. Livesey's evidence—he hoped at the next sitting of the Committee—he would refer to his remarks on amalgamation. The amalgamations had the effect of raising the illuminating power of the gas supplied and reducing the impurities in the gas, and brought the whole Company under the purview of the Board of Trade. Witness went on to point out that Sir Courtenay Boyle, in his tables, adopted in all cases the maximum prices charged by the Company. The Gaslight and Coke Company were the only Metropolitan Gas Company under an obligation to charge differential prices, and therefore, in comparing, they should deal with the average and not the maximum prices charged. He hoped the Committee would admit the fairness of this, seeing that they were compelled to charge different prices north and south.

What do you mean by "average?"—I take the quantity sold at the higher with the quantity sold at the lower, and I shall deal with the average of the two prices.

Do you mean by dividing by 2?—No; in proportion to their quantities. Sir Courtenay Boyle said nearly all the large companies and corporations throughout England have reduced the price of gas, and we alone had raised it. But I have taken out his figures, and I find that, out of the twenty large towns, six only have reduced the price of gas to a greater extent than we have done, eleven to a less extent, two have reduced the price equally with us, and one has raised it. Of the other thirteen towns he enumerated, six have reduced the price, four have raised it, and in three no alteration has been made.

That is since when?—Since 1882 and 1889. Witness handed in the table given on the next page, showing the net price charged for gas and meter-rental in the years 1883 and 1898, and the increase in gas sold. Continuing, he said that in the table he took the year 1883 to start with; being unable to take the year 1882—the one taken by Sir Courtenay Boyle—because there were no published figures for it, and had brought down the comparison from 1898, the year when The Gaslight and Coke Company raised their charge. The important point in connection with the price was the increase in the quantity of gas sold. The table showed that the South Metropolitan Company had had an increase over fifteen or sixteen years, of 121 per cent., the Commercial of 51 per cent., and The Gaslight and Coke Company of 41 per cent. The South Metropolitan Company had been able to reduce their price by 7·24d.; the Commercial, by 3·9d.; and the Gaslight Company by 4d. This showed that there was relation between the quantity of gas sold and the reduction in price. If they had looked at the Greater London series—for the districts adjoining the Metropolitan area—they would see that, owing to the enormous increase in the gas sales, the reductions in the price there had been most marvellous. Taken in the aggregate, the large increase in dividends had enabled the Companies to reduce the price of gas. The same thing applied in more or less degree to the Provincial Corporations and Companies.

—	Net Gas and Meter Rental. 1883.	1898.	Increase or Decrease.	Increase per Cent. in Gas Sold (1898 over 1883).
Metropolitan and Suburban Companies.	s. d.	s. d.	d.	Per Cent.
South Metropolitan	2 10·48	2 3·24	7·24	121·7
Commercial	2 10·64	2 6·74	3·90	50·9
Gaslight	3 2·62	2 10·62	4·00	41·5
Hornsey	4 7 (*a*)	3 2 (*a*)	say 17·00	438·2
Wandsworth	3 4·02	2 3·91	12·11	209·9
West Ham	3 6·59	3 0·15	6·44	177·7
Tottenham	3 7·55	3 0·04	7·51	152·6
Lea Bridge	5 0·50	3 11·11	13·39	136·3
Bromley	3 11·45	3 0·97	10·48	132·9
Croydon	3 6·99	2 9·37	9·62	112·5
Brentford	3 8·32	3 0·99	7·33	109·5
Mitcham	4 2·33	3 8·18	6·15	108·6
Richmond	3 7·56	3 0·26	7·30	101·9
Crystal Palace	3 1·29	2 7·49	5·80	90·8
Provincial Corporations or Companies.				
Corporations—	s. d.	s. d.	d.	Per Cent.
Glasgow	3 6 (*a*)	2 2 (*a*)	say 16·00	146·8
Leicester	2 7·72	2 4·29	3·43	111·5
Birmingham	2 4·07	2 1·21	2·86	81·9
Salford	3 2·74	2 2·24	12·50	79·4
Oldham	2 10·35	2 1·25	9·10	76·7
Bolton	2 9·36	2 7·12	2·24	73·5
Carlisle	2 6 (*a*)	2 3 (*a*)	say 3·00	68·6
Manchester	2 8·20	2 4·73	3·47	66·9
Nottingham	(*a*) 2/4 2/6	(*a*) 2/0 2/6	say 4·00	36·4
Companies—				
Newcastle	1 9·57	1 9·34	0·23	114·7
Plymouth	2 0·95	1 10·49	2·46	103·7
Sheffield	2 3·24	1 10·95	4·29	92·8
Rochester	2 9 (*a*)	2 6 (*a*)	say 3·00	76·6
Portsea	2 11·99	2 4·80	7·19	71·0
Bristol	2 7·93	2 4·22	3·71	68·5
Derby	2 6·94	(*b*)2 6·80	(*c*) 0·14	(*c*) 52·9
Brighton	3 4·07	2 10·30	5·77	46·2
Bath	2 6·70	2 7·22	0·52*	46·1
Liverpool	2 10·76	(*b*)2 9·64	(*c*) 1·12	(*c*) 35·5
Dublin	3 9 (*a*)	3 5 (*a*)	say 4·00	25·1

(*a*) Price charged. (*b*) Year 1897. (*c*) 1897 over 1883. * Increase.

I notice, in these Greater London Companies, their initial price in 1883 was very much higher?—Yes.

Therefore I suppose they could afford to reduce more?—They were smaller Companies; but the great increase in their business has enabled them to come down from those large figures to what are really very moderate figures indeed.

Mr. Nicol: You argue that, owing to the want of expansion of business, you have not been able, in your Company, to make the reduction shown by the other Companies?

Witness: Yes; I shall prove that absolutely, especially in relation to capital, which we all admit is the most important item we are discussing before this Committee.

The Chairman: I suppose that argument of yours has limitations. There is surely a point which will be reached beyond which increase would not give you very much more profit in gas making?

Witness: Well, that depends to what extent the cheapening of the cost of erecting new works goes on. Dealing with the current period, and comparing that with the old works built twenty or thirty years ago, the cost of construction would be very much less now; and if that is maintained, the larger proportion of business you have will enable you to construct your works at a proportionately lower price.

In answer to further questions, witness said, with reference to the differential charge north and south of the Thames, that this was a stipulation which the Directors of the Gaslight Company did not like, because they objected to any price they might have to charge being subjected to the regulation of some other Company. Some years prior to 1883, the South Metropolitan and the Gaslight Company were negotiating, with the cognizance of the London Company, for the division of the latter Company between the north and the south. The scheme was to give the South Metropolitan Company the district south of the Thames, and the Gaslight Company the larger district on the north. The difference between them was as to who should have the works south of the Thames at Nine Elms. The Gaslight Company's contention was that the southern district should take them. The two Companies could not agree as to the value of the works, nor as to the apportionment of the capital of the London Company between the two; and, to use an expression which Mr. Livesey had applied to the Gaslight Company more than once, he (Mr. Livesey) rather over-stayed the market. The Gaslight Company ultimately came to terms with the London Company; and other attempts having failed, the Directors thought they had better accept the scheme, with the clause as to the price in the district south of the Thames being the same as that which the South Metropolitan Company charged. The question was: To what extent did the differential price south of the Thames damage consumers on the north? They had heard from Mr. Hunt—and Mr. Livesey endorsed his view—that the north must pay for the south. Mr. Hunt said the Gaslight Company were actually losing 8d. on every 1000 cubic feet of gas they sold at 2s. 2d. on the south. Of course, this was not so. Mr. Hunt stated what was perfectly true—that the Gaslight Company had a slight advantage with reference to the Nine Elms station, in the fact that coal was brought up by special boats and delivered alongside the wharf there without breaking bulk. Another most important factor enabling gas to be made more economically there was that those works were constructed very cheaply; the capital charge in respect of gas made there being considerably below the charge for capital in respect of the other parts of the Company's area.

Mr. Baldwin: Is all the gas consumed in the south made at Nine Elms?

Witness: Yes; and twice as much as is consumed in the south is made at Nine Elms and sent away to the north, because the Nine Elms works are three times as large as is necessary for the supply of the south. The result is that we are making gas at those works, including capital charges, distributing, and all other charges, at 2s. 4·45d. The price charged last year was 2s. 3d. I purposely do not deal with the current year, because nobody knows what may happen in it.

Mr. Cohen: Then it was sold at a loss?

Witness: At a loss of nearly 1½d., against Mr. Hunt's 8d. The quantity of gas made and sold in that southern district is 953 millions per annum, and that at 1·45d. per 1000 cubic feet works out at £5759.

The Chairman: Loss?

Witness: Loss. That £5759 applied to the 20 million cubic feet of gas sold by us in the north of London equals 0·07d. per 1000 cubic feet.

Mr. Nicol: Of loss?

Witness: Loss. That is the entire loss apportioned per 1000 cubic feet of gas sold in the north of London.

Mr. Cohen: I do not follow that figure of 20 millions. You sold more than 20 millions in the north of London.

Witness: 20,000 millions I should say. Applying that 0·07d. to the consumers in the north of London, it means that a consumer burning £5 worth of gas hands over to the south of London 2·33d. in a year. Continuing, witness said that two-thirds of the gas made so cheaply at the Nine Elms works went to the north; therefore they held that the people in the north did not lose even the 2·33d.—that there was no loss, because the Company were able to sell in the north the gas which they could make at Nine Elms cheaper than they could make it in the north of London.

The Chairman: Is your contention that the north pays nothing at all?

Witness: Nothing at all.

Mr. Cohen: Upon this bargain?

Witness: Upon this bargain.

Sir F. Dixon-Hartland: You charge 3s. at one place, and make the gas at 2s. 4½d.?

Witness: Yes.

Therefore the north gets a profit of 7½d. on every 1000 cubic feet of the two-thirds that is sent to the north?—That is so.

How is that accounted for?—2s. 4½d. against 3s. Therefore they would get 7½d.

How much goes to the north?—I think it is 953 millions in the south, and about 1100 millions in the north—it is about half. Out of the 20,000 millions consumed in the north, something like 1000 millions come from the south.

The Chairman: Does the sum of your calculations come to this result—that, having this portion in the south makes no difference to your price in the north?

Witness: That is our contention. Of course, the Committee quite understand that figures of this kind vary from year to year. Working it out, it seems to me that there is absolutely no loss incurred by the north in respect of this bargain.

Mr. Cohen: I have not followed that argument—that, besides the consideration of the cheap production, the north gets the benefit on 1100 millions of the cheaper cost of production at the Nine Elms works. It seems to me that the cheaper cost of production goes into the pockets of the Gaslight Company, because you do not make any difference in the price in the north?

Witness: Suppose the Nine Elms station a separate undertaking, and attached to those works was this district of 950 millions. They would have to sell, such is the capacity of their works, another 1000 millions somewhere else. If they were entirely independent, they would be able to sell that in bulk and get their profit; but inasmuch as the consumer in the north is the buyer, he is able to get that quantity of gas at a cheaper rate than he would have done if he bought it from some of the other works in the north of London.

But, as a matter of fact, he does not, because you do not have two prices north of the Thames?—No.

Therefore the cheaper cost of production in the south goes into the pockets of the producer, The Gaslight and Coke Company?—And The Gaslight and Coke Company, being the seller in the north of London, is able to keep the price of gas to his northern consumers at a proportionately lower figure by reason of this cheap production.

The Chairman: How do you deal with the £5759 which you say is a loss?

Witness: Against that I set the profit gained by the 1000 millions.

Sir F. Dixon-Hartland: Supposing you had the Nine Elms works and no southern supply, the whole of the gas would be made at 2s. 4½d. per 1000 cubic feet for the north, and therefore the north would get the profit?

Witness: But if we had not this district south of the Thames, we should not have the works.

Sir F. D. Hartland: Why not?

The Chairman: That is the supposition. (*To witness:*) The honourable member's question is: If you still have the power of supplying the cheaper gas and got rid of this loss of £5759, you surely would be better off?

Witness: I think that is so. I do not see how you would get rid——

Sir F. Dixon-Hartland: Suppose Parliament gave the district to the South Metropolitan Company, and left you the works for supplying the north, there would be a saving to the north of a considerable amount?

Witness: Well, I am afraid I do not see quite how that would work.

The Chairman: Still, on the supposition of the question, that seems to be common sense, if you get rid of your loss of £5759 which you say you incur in supplying the south. We must, of course, take it that none of the price charged in the north is to make up any loss in the south?

Witness: You may be quite certain of that.

May I ask how you meet your loss in the south?—The cost of making gas generally amounts to so much. As regards the price in the south, our rate is settled by the South Metropolitan Company; the price in the north is fixed in proportion to the cost of making gas.

This £5759 goes to the debit of your revenue account?—Yes. It is not shown anywhere because we do not keep an account as between north and south. I will now deal with the cost of automatic meter supply. The regulation of price there is by statute, and fixed according to sliding-scale; and as we have one price for all consumers of gas for

light, we cannot charge more or less than the current price for the year. But as regards the charge for stoves and fittings, that is a matter which is absolutely in the power of the Gas Companies—one as between themselves and the consumers. In dealing with the automatic meter people, we can only charge them the current price of the day for gas; and then we may add whatever we and the consumer may agree upon by way of rent for the stoves and fittings. Although the Companies do charge the automatic consumers per 1000 cubic feet above the current price for gas, this charge is not all for gas.

Have these automatic consumers, if they put in 1d. or 1s., any idea what they are paying for gas and what interest for meter?—No.

So that to them it is a price for gas?—We make it clear in the contract. The Company now charge 1d. for 22 cubic feet of gas, which includes the use of stove and fittings.

Sir F. Dixon-Hartland: Why have you reduced it from 25 to 22 cubic feet. The contention is that in reality you incur no larger charge for fittings, &c., than you did; yet you take away from them 3 cubic feet of gas.

Witness: The whole of that 3 cubic feet was not in respect of increased charge for fittings; a proportion was in respect of the increased price of gas.

The Chairman: That does mean that you have increased the price of gas?

Witness: We have increased the price north of the Thames 2d.

Sir F. Dixon-Hartland: The 3 cubic feet comes to 2d.?

Witness: No; the 2d. is included in the reduction of 3 cubic feet for 1d.

Mr. Cohen: You raise the price of gas 2d. per 1000 cubic feet to consumers, who take it per 1000; and it was necessary in your view to give the penny-in-the-slot consumers a proportionate increase of charge?

Witness: Just so.

The increase to which they were subjected is represented, not by charging more, but by giving less gas for the same money?—Quite so.

Sir F. Dixon-Hartland: I want to know if the 3 cubic feet is the same as the 2d.?

Witness: No; it is not, because the reduction from 25 to 22 cubic feet was the equivalent of two things—of a 2d. rise in the price of gas, and an increased charge for the use of fittings.

Why the increased charge for fittings? The fittings are exactly the same as before?—Yes. When we first commenced, it was in the good times of gas companies; and we fixed an all-round price. We had so much bother—complaint—with the differential price north and south, that the Directors said: "If you can avoid introducing another differential price, and charge all these slot consumers north and south of the Thames the same, it will be a very convenient thing." When we fixed the 3s. 4d. per 1000 cubic feet, we were charging 2s. 10d. for the gas, which left only 6d. for the use of the fittings. This was quite out of the question; it did not meet the expense. I think Mr. Livesey and Mr. Jones, and other Engineers, have all agreed that 9d. or 10d. would be required to bring back to the Company the full amount expended—capital, interest, depreciation of fittings, and the use of the fittings. Therefore the 6d. was an inadequate charge.

Your answer is that you were charging too little before for your fittings?—Yes.

Mr. Cohen: During the interval that this arrangement lasted, your slot consumers were getting their gas north of the Thames cheaper than what I may call the wholesale consumers.

Witness: Well, we must not say that; but they were getting their fittings cheaper. When we, very unfortunately, increased the price of gas last year, the Directors said: "It is quite time we revised this arrangement; it is not fair to the man in the south. We cannot raise his price, but we must put something more on the people in the north in order that they may pay something nearer the actual outlay the Company have incurred." It amounts to this—that we are charging 2s. 2d. for gas on the south, and the consumer in the south gets his fittings for 1s. 2½d. The consumer in the north has to pay 3s.; but we only charge him 9½d. for fittings. This makes the price 3s. 9½d. in the north, against 3s. 4½d. in the south. The right way to look at it is to assume that for the gas-fittings north and south we charge something about 10½d., taking an average figure again. On March 31, 1898, we had in the north 77,000 slot-meter consumers, and in the south 10,000. In March, 1899, the respective figures were 91,000 and 12,000; the increase in the north being 14,000, and in the south 2000. Therefore, despite the proportionately higher price for fittings, the consumer in the south appreciates this system to an even greater extent than the consumer in the north, and does not resent the proportionately higher charges. I infer from this that the consumer does not object to the higher price.

The Chairman: You think he knows it?

Witness: Oh, yes.

Then the south is better off again?—Yes.

Do you supply these slot-meter consumers at a profit?—Yes.

Both north and south?—Well, I should say they both pay.

Sir F. Dixon-Hartland: You said a moment ago that the slot-consumers just pay.

Witness: Yes, that was in the south; but they do pay. They not only pay interest on the ordinary capital of the Company—which is chargeable, of course, to all gas made—but also the interest on the extra outlay in respect of stoves and fittings, the full cost of depreciation and collection, and all charges. I think the automatic meter has been a very special advantage to us. It has come to fill up the blank which has been caused by the electric lighting. The enormous reduction—the loss—we have incurred by the introduction of electricity has been very largely met by these automatic meters; and they have been therefore a greater boon to us, perhaps, than to any other company.

The Chairman: What character of houses are they in which these automatic meters are fixed?

Witness: The very smallest—I will not say the worst, but the poorest; the blocks of workmen's buildings, and really the very poor people.

People who are not likely to have the electric light?—No; and whom it would be very difficult indeed to supply under the ordinary system of quarterly accounts.

Then you maintain that the large houses that are being built are being chiefly supplied by electricity?—I am sorry to say they are, to a large extent. But we hope and believe, and think it is reasonable to believe, that when the Welsbach patent runs out at the end of this year, there will be a very large extension by the use of this burner.

Does that apply to incandescent burners; Yes.

Mr. Nicol: You show in your table, No. 6, the actual cost of fitting meters as £8 13s. 8d.

Witness: Yes.

We have had evidence that some of the other Companies estimate this at about £5. Can you explain why in your case it is nearly £9.—I know Mr. Livesey used to say, when the system was first introduced, he could do something of the kind for £5; but I do not think you have had any evidence before this Committee showing that the expenditure has been limited to £5 in every case. I do not think it has been given as £5.

The Chairman: I think he admitted, what you contend also I suppose, that your fittings are of a more elaborate character?

Witness: Yes.

Examination continued: They gave a larger meter, a better stove, an better fittings. With regard to the latter, they must remember that they were fitting houses of a rough class, inhabited by people who were not accustomed to take very great care of the fittings; and if fittings were injured or destroyed, there was not only loss but risk of an escape of gas, with consequent danger. Therefore the Company maintained, and had maintained throughout, that rather than run any risk of this kind, they would put in the best and strongest fittings. Throughout the whole of the fittings, instead of using composition pipe, they had employed iron barrel pipe, which it was almost impossible to break. Then there were the service-pipes. The cost of road work in London was getting very serious indeed—in the north especially. The cost of work in connection with repairing added very considerably to the Company's charges. The Company had their full value for the £8 13s. 8d. As regards the £3 10s. (included in the larger figure) for fittings, the whole was charged, not to capital, but to suspense account, and was being written off at a very rapid rate. Last year £53,000 was written off under this head.

Mr. Lough: How long do you think it will take to exhaust?

Witness: I think we reckon about another five years. It is not as though the suspense account were finished. During the past year we added so many consumers that the sum we wrote off was more than equalled by the amount of additional work. We expect that in the year 1904 or 1905 the whole will be written off, and then there will be a large increase of revenue.

You only write off the fittings?—Yes.

Not the meters or stoves?—No; those are capital charges, and the service-pipes too. I quite agree with Mr. Livesey that the reason the gas companies deal with fittings differently from the meters and stoves is that the meters and stoves, if the consumer leaves off taking gas, can be removed; but the fittings in the house would cost more to take down than their value. The labour is included in the £3 10s. carried to the suspense account.

The Chairman: You said something just now about the expense of your road work. That appears to me an important point. Is that one reason you say you require larger capital?

Witness: Yes. I will not deal with the figures, because the Engineer will explain that. It is a most important item, as the capital of gas companies is very largely expended in laying mains, and work of that kind, in the street. Whereas in the old days the cost of repavement used to be only 1s., in some cases it is now 12s. to 15s.

Do you wish to draw any comparison between the cost you are put to and the cost the South Metropolitan are put to in this matter?—Yes. That is one of the differences between us. I will now deal with the question of the reduction in the price of gas.

It was then explained by witness that the table on p. 1666 gave the net price of gas and meter-rental, year by year, from 1876; showing the increase and decrease in the price also year by year, the increase or decrease in the gas sold, and the corresponding figures for the South Metropolitan and the Commercial Companies. The table showed that the reductions made since 1876 by the Gaslight Company amounted to 11·14d., by the South Metropolitan Company to 14·02d., and by the Commercial Company to 14·20d.

Mr. Lough: Where do you charge the 2s. 10·62d. (given as the present price of the Gaslight Company)?

Witness: That is the average price charged north and south of the Thames.

Mr. Lough: But, Mr. Chairman, is that a fair price to give us?

The Chairman: That is a matter for decision. The witness says you must put the whole thing together, and take an average of the price.

Witness: It is a most important matter, and the *crux* of the whole position, in fact. Continuing, he pointed out that the table showed that all the Companies came down in price as between 1876 and 1889. The reduction in that time by the Gaslight Company was about 15d., by the South Metropolitan Company about 14d., and by the Commercial Company nearly 16d. So that here the same influences which governed the South Metropolitan and Commercial Companies equally governed the management of the Gaslight Company. The figure of increase per cent. of business in the same period was with the Gaslight Company 4·73, with the South Metropolitan Company 1·56, and with the Commercial Company 1·93. In the next period—1890 to 1893—all the Companies raised their prices; and for the first time since 1876 there was a decrease in the gas sold by all. The South Metropolitan were more fortunate than the Gaslight Company, nearly maintaining their increase; but they also were obliged to raise their price. The Commercial Company, like The Gaslight and Coke Company, suffered from a reduction, and were also obliged to raise their price. Witness added that he was merely dealing with the periods selected—annual comparisons were not of much use. From 1894 to 1897, there was a uniform reduction in price in all three cases, and a uniform increase in business, especially with the South Metropolitan Company. The reductions in price between 1876 and 1897 were: Gaslight and Coke, 1s. 0·4d.; South Metropolitan, 1s. 1·6d.; and Commercial, 1s. 2·2d. When the Committee considered the wonderful difference which must exist between three Companies working under different circumstances regarding districts, and, above all, price of coal, sale of residuals, and increase of business, he thought the closeness of the comparison was something to be wondered at—that each should aim to reduce the charge for gas, and so bring down, almost to within a penny, the price all over London.

The CHAIRMAN: You wish the general inference to be drawn that the increase in the consumption of gas is the ruling factor in lessening the price all round.

Witness: It is not a material factor in the cost of manufacture; but it is material because it enables the Companies to reduce their capital charges. Whatever has been said about the management, I would just remind the Committee that the reductions in price between 1876 and 1897 have been brought about under precisely the same management as compelled the slight increase in the year 1898. I think the management of the three Companies for the three periods must have been very close.

Mr. LOUGH: You make a comparison between The Gaslight and Coke and South Metropolitan Companies; but one started in 1876 4½d. under the other. The higher you are, the more you ought to be able to reduce. The Gaslight and Coke Company started higher than the other, and yet you reduced less?

Witness: Look at the Commercial Company. And you must bear in mind that when we were before Parliament in 1876 we were charging 3s. 9d., and the South Metropolitan 3s. 6d. This is no new thing; we went through the whole of these figures in 1876. The question of capital and the questions of coals and residuals were all fought out, and yet Parliament gave us a 3s. 9d. standard price against their 3s. 6d.

The CHAIRMAN: The contention is that the reduction of your Company has been very nearly that of the others?

Witness: That is our contention.

You say in your synopsis: "No comparison of prices can be of any value unless taken in conjunction with illuminating power, purity, and other conditions of supply?"—That is in connection with what Mr. Haward said. He compared us with a large number of gas undertakings both in the Suburbs and in the Provinces, and he made no reference to the altered conditions of supply. Some companies are supplying 14 or 15 candle power gas under very moderate restrictions; and we are obliged to supply 16-candle power gas under the most rigid testing I suppose of any in the United Kingdom. The testing of gas on the north—and I think Mr. Livesey agrees with me—is even more rigid than on the south, by reason of the greater number of testing-stations.

Sir F. DIXON-HARTLAND: Do you mean to say your testing is not the same as the South Metropolitan Company?—It is more rigorous.

Mr. LOUGH: What practically does it amount to? Does it affect the price?—I cannot say; but it is a material factor.

Mr. COHEN: Do you differ from Mr. Livesey's point, that the illuminating power of the gas supplied does not affect its cost? He told us that last week.—I do not think he said that. It is on record that Mr. Livesey said some years ago that to raise the illuminating power of London gas from under 15 to 16 candles, would cost 2d. per 1000 cubic feet.

Perhaps I am mistaken?—I do not suppose you would find two gas engineers to agree on that or any other figure as regards the cost of raising the illuminating power.

Mr. COHEN: We are not concerned with illuminating power, but we are with price.

Mr. LOUGH submitted that if there was anything in the suggestion that the stricter illuminating power conditions in North London accounted in part for the difference between the price north and south of the Thames, they should have the point elaborated.

After some discussion, it was understood that the witness would refer further to the matter when dealing with the question of coal. He should not say the cost of extra purity and illuminating power would mean more than ¼d. per 1000 cubic feet.

Witness (continuing) alluded to the reserve fund, regarding which Sir Courtenay Boyle seemed under a misapprehension. He said that if the Companies could put by a reserve fund for other years, it amounted to paying a higher dividend. It was quite impossible for a Company under the sliding-scale to pay a higher dividend than they were entitled to, whether from profit made in the half year, or by a draft on the reserve fund. Even if a Company were tempted to do it, the Board of Trade Auditor would at once prohibit it. He (witness) was under the impression the Committee thought it was possible for a Company to carry to reserve fund something more than they could have divided.

Mr. COHEN: Yes.

Witness: That is impossible. Suppose we are entitled to pay 12 per cent. under the sliding-scale. The shareholders can say: "We will take 10 per cent. and put by 2 per cent. to reserve fund." But if the profits of the Company are in excess of 12 per cent., we cannot carry to reserve anything beyond the 12 per cent. which otherwise we might have divided among our shareholders. Excess of profits over the statutory dividend is carried forward from year to year as undivided balance.

The CHAIRMAN: It is only the amount which the shareholders willingly give up that they carry to reserve?—Yes; might I call it a self-denying ordinance?

Suppose you have a profit, which would have paid a larger dividend if you chose to reduce your price, and that you prefer to maintain your price and pay a smaller dividend, could you not carry the surplus of what you have made to reserve?—You can only carry it forward. You must bear in mind the difference between carrying forward and carrying to reserve. The amount carried forward is the amount of undivided balance after paying dividend, or carrying the equivalent sum to reserve; the balance is carried forward to the following year, and is applicable to the reduction of the price of gas the next year.

Mr. COHEN: Or dividend?—Well, the reduction of price would carry the increase of dividend.

Mr. LOUGH: You can have no reserve fund except for the purpose of paying dividend?—For the purpose of paying dividend. We cannot have any reserve fund unless we sacrifice our dividend.

Practically you use it all; you have no reserve fund. Do you think that helps you in the management?—Well, how are you to get a reserve fund? If we are to have a reserve, we should have to increase the price of gas. In order to keep the price low, we have sacrificed every penny piece in our pockets almost.

The CHAIRMAN: Mr. Lough's question is: Do you think it a wise provision that there should be this small reserve?

Mr. LOUGH: Practically no reserve fund.

Witness: To have a reserve fund for the liquidation of our capital expended, would involve a very serious increase in the price of gas.

Or diminution of dividend. Do you think it assists or hampers you in carrying on the business?—No, it does not hamper us.

The CHAIRMAN: If you were without an Act of Parliament, would the Directors prefer to have a reserve fund?—No; they would reduce the price of gas. If you reduce your dividend, you reduce the value of your stock; and when you go to Parliament to get more capital, instead of getting £300 for your stock, you would only get (say) £200. In this way you would gain nothing. The auction clauses are designed to enable you to raise your capital at the lowest possible rate; and there is nothing gained by reducing your dividend.

Mr. LOUGH: You had once a reserve fund of £560,000; and you say you have used it all to pay dividends with, and you have now only £49,000?—It is not quite right to say it was all paid away in dividends. If we had not had recourse to our reserve fund in 1880, it would have been quite within the power of the Directors, with a view to maintaining the reserve, to have raised the price of gas and reduced the dividend correspondingly; but if we had done so, we should have had to raise the price of gas in 1890 by 2d., in 1891 by 2½d., and again in 1897.

Were you any better off as a Company when you had this reserve, than now when you have none?—Whether we are better or worse, is shown by the price of our stock in the market.

This reserve fund is of no use to you?—No. Suppose instead of depleting our reserve fund of £560,000 we had put the price up, would not the Local Authorities—and with some reason—have said it was very hard that the consumers, for some temporary reason, involving extra cost in gas making, have to put up with a large increase in the price of gas, when the Company had a reserve fund of £560,000 doing nothing?

But you only succeeded in postponing the increase in the price for one or two years?—I maintain that no stronger proof could be given this Committee of the earnestness of The Gaslight and Coke Company to postpone the raising of the price.

The CHAIRMAN: I understand your view upon the reserve fund is that you quite agree with the enactments affecting it, and that you do not wish to see them altered?—Yes.

Mr. NICOL: After your reserve fund had been exhausted, you are now placed in the position that, owing to the agitation in London in reference to your raising the price of gas, your Company are before this Committee?—Yes.

The CHAIRMAN: I think you agree that the maintenance of a revenue fund would enable you to make a more equal charge for gas?—Yes.

Would that not be a good thing?—Yes; and that is precisely what our reserve did accomplish.

We all agree to that; but you got rid of nearly all of it. Therefore you are no longer maintaining that line of business?—No.

What Mr. Lough wishes to know is why you altered that kind of management, and got rid of the large reserve?—Because we thought until the very last moment that the circumstances and conditions which were adversely affecting the Company during the past few years—reduction in price, increase in cost of coal, and less returns for residuals—were temporary. We were firmly of opinion that this £560,000 would have enabled us to tide over the difficulty. If we had had a very cold, foggy winter, we should not have had to increase the price.

Mr. NICOL: It would not have recouped the half-million?—No; but it would have obviated the necessity for increasing the price. It has been fine weather for five years—open winter; no frost.

Examination continued: They were killing the goose that laid the golden eggs by sending out stoves by the thousand. There was no necessity for a reserve fund. A reserve fund must enhance the price; and anything which enhanced the price must be a detriment to a Company. It would not improve the status of the Company; that could only be improved by keeping the price down.

The CHAIRMAN: I am not quite clear why it should increase the price of gas. Where is it to come from? On one side they had the auction clauses, and on the other the sliding-scale. Under the auction clauses, when raising stock, they advertised, telling the public what the rights and privileges and prospects of the Company were. In view of all these advantages, the buyer gave the very top price for stock. After a man had given £300 for stock on the faith of a 12 per cent. dividend, could they turn round and say they were not compelled to give it him? First, it would not be honest; and then, if they once broke faith with the people who bought by auction or tender, the next time they raised capital they would get a very small price. Where was the consumer benefited by that?—It was only by raising capital cheaply that the consumer obtained cheap gas.

Would not the knowledge that there was a big reserve fund which would be called upon to aid in bad times be a strong inducement to the buyer to give a good price?—I do not think he would be influenced by that so much as by the higher dividend. I think I shall be able to show the Committee that, even when we had £560,000 of reserve we did not get a proportionately higher price in the market.

Mr. COHEN: You surely do not dispute that the existence of a fund, which would protect shareholders from too great a diminution in the profits, would be a factor that every prudent investor would bear in mind?—Yes; and it would be a very comfortable thing for those who have the management of gas companies to have at their back. But the price you would have to pay for it would be more than it is worth.

The Committee having adjourned for luncheon, on re-assembling the Chair was taken by Mr. COHEN.

Witness: I think there is only one matter in connection with the reserve fund to which I should like to call the attention of the Committee; and that is in reference to the criticism of Mr. Haward. He said the action of this Company and the position of the reserve fund was in strong contrast to that of other Companies. But I find that the South Metropolitan Company—and, of course, we must all look to them as the paragon in respect of the reserve fund—reduced their reserve fund from £220,000 to £37,788, for precisely the same reason that we reduced ours from £560,000 to £50,000. Both Companies were equally influenced by an earnest desire to postpone until the last moment an increase in the price of gas.

A MEMBER of the COMMITTEE: But two wrongs do not make a right.

Witness: That is so.

The CHAIRMAN: The South Metropolitan Company's reserve fund is £101,000, and it has never been higher than £207,000. Yours has fallen from £560,000 to £49,000?

Witness: Yes. But there is an intermediate figure in the case of the other Company. The South Metropolitan reserve fund fell to £37,788.

Was it ever as low as that?—Yes; in 1891.

I do not want to put one Company against another, but it may be claimed that their policy is different from the one you follow, their reserve fund having been built up again from £37,000 to £101,000?—They immediately afterwards raised the price of gas.

But they also concurrently are restoring the reserve fund. I am not arguing whether they were right or not; but when you say that there has been an identity of policy between the two Companies, I say the figures do not support that?—Mr. Haward said that our decrease of the reserve fund was in contrast to the action of the South Metropolitan Company. All I want to show is that we both acted on the same lines, and both for the same purposes.

But the figures do not support that allegation. Whether it is right or wrong to restore the reserve fund, I am not now arguing. As a matter of fact, the South Metropolitan Company did draw their reserve fund down to £37,000; but they have restored it?—Quite so.

And The Gaslight and Coke Company also drew on theirs, but have not, so far as I know, restored it. They may be right; but that is not identity of policy?—We both did the same thing. Rather than raise the price of gas, we both had recourse to the reserve fund and depleted it to a low figure. Since that time, I grant you, the South Metropolitan Company have increased the fund.

Therefore, there was an identity so far as depletion is concerned, but a difference so far as replenishment is concerned?—Yes. I do not know that I have much more to say about the table which shows the balance of undivided profits on the balances which we have after dividing full dividend, and what we have carried forward according to Act of Parliament, which forms a part of the divisible profit for the next year. The figures I would draw attention to you will find under the heading: "Aggregate Net Surplus at the End of the Year." You will find that these figures in 1887 amounted to £189,460, and in 1888 to £304,000. I was in communication with the Government Auditor as to whether the undivided balances should be limited; and he was of opinion that, so long as we kept them within a reasonable figure he would not object to our holding them in addition to the reserve fund.

Kept separate from the reserve fund?—Yes. The question came before a Court of Law in the case of the Ashton Gas Company; and the Court of Appeal decided, in 1884, that the holding of such surplus balances, so long as they were kept within reasonable figures, was in the right of the Gas Company. In accordance with the decision of the Board of Trade Auditor, therefore, we kept these balances. I will point out how we disposed of them——

But what are they?—Undivided profits at the end of a particular period—at the end of each year.

They were shown as such to the shareholders in your accounts?—Yes. In 1883 the accumulation we had (£189,000) enabled us to make a reduction of 2d. per 1000 feet in the price of gas. We reduced the price of gas by £140,000.

The expression at the head of the column is "Aggregate Net Surplus at the End of the Year." Does that mean aggregate?—Yes. The next large item was in 1887; and that enabled us to make a reduction in 1888 of 3d. per 1000 cubic feet. In the following year the accumulation was £304,000. There were several prosperous years for all Gas Companies. We were able to make a reduction in 1889 of 3d. per 1000 feet. We made no accumulation in 1889, 1890, and 1891, but had deficits of £106,000, £344,000, and £308,000. In the year following, we made no large accumulation—there was no large one until June, 1894, when we reduced the price to 2s. 10d. In 1894 we had £255,000; and then came three bad years. The result has been that £255,000 was reduced to £164,000 in 1895, further to £45,000 in 1896, and in 1897 we took a big bite out of our reserve fund—reducing it from £132,000 to £48,000. In connection with my next point I would put in the following table:—

Balance on Jan. 1, 1876			£68,132
Interest added from this date to Dec. 31, 1898		£52,210	
Withdrawals during the period—			
For Explosion in Tottenham Court Road in 1880	£16,225		
Strike of Durham Miners in 1892	10,437		
Explosion at New Church Court, Strand, in 1895	9,332		
Sundries	3,058		
		39,052	
Surplus of interest over withdrawals			13,158
Balance in fund on Dec. 31, 1898			£81,290
1 per cent. on paid-up capital of the Company, on Dec. 31, 1898 (£9,029,000) = £90,290 = 1·03d. per 1000 c.f.			
Maximum amount of fund on Dec. 31, 1898, under the provisions of the Company's Act			£451,450
Actual amount of the fund, as above			81,290
Amount saved to the consumers of gas, subject to a reduction of one-sixth in respect of sliding-scale dividend			£370,160

I do not think I need trouble the Committee on this head except as to one little point in Mr. Haward's evidence. I find that the fund up to 1876 was compulsory. If in any year we had an amount of profit larger than what was needed to pay our dividend, we were obliged to carry to the reserve fund to the extent of a maximum of 1 per cent. for insurance. Up to 1876, as I have said, that was compulsory. We could only carry the money to the insurance fund out of the profits made in any one year. Therefore, if we carried an amount forward from year to year, we were not able to apply it to the insurance fund. In 1876, however, it was provided that if the profits of the undertaking amounted to a larger sum than was sufficient to pay the standard rate of dividend, the excess must from time to time be invested in an insurance fund.

The Chairman: Was it an insurance against fire?

Witness: It was an insurance against accidents which due care and management on the part of the Company might prevent. If we were negligent, and an accident resulted, of course, we should not have to go to our insurance fund; but in respect of any unforeseen accident, we were entitled to claim against the insurance fund. I will give you an instance. The only dispute or discussion we have had with the Official Auditor was in this way. We claimed some years ago to charge against the insurance fund the loss of a cargo of coal. The Auditor contended that if we had insured the cargo of coal, which we had not, we should have incurred no loss; but the interpretation of the Act of Parliament was that it was an accident which due care and management might have prevented. The matter went to the Board of Trade, and was referred to the Speaker's Counsel. He decided that "due care and management might have prevented" meant not want of foresight on the part of the Directors, but the wreck itself, which had not happened owing to a want of due care and management on the part of the Company; and that we might go to the fund. It was in regard to accidents of this kind that the fund was to apply.

Do you not insure as to fire?—We insure in respect to offices and dwelling-houses, but not in regard to gas-works. With reference to gas-works, the premium which would be charged would be prohibitive. I think I can satisfy the Committee, if they will refer to the statement giving our experience for the past twenty years, that we have been right. We started in January, 1876, with a capital sum of £68,132.

Was there any doubt as to whether the strike of the Durham miners was a contingency in contemplation when the insurance fund was established?—The Board of Trade Auditor had no doubt whatever. It was an accident—or, at any rate, an incident which came under the terms of the arrangement I have referred to.

Sir F. Dixon-Hartland: Is it not usual to accept fire risk yourselves, and to put aside a certain amount of money on that account every year equal to what you would otherwise have to pay an insurance company? You were not running risk without any fund to meet it?—The actual amount of the fund was £81,290.

That is not only against fire?—No; that is against everything.

Then you have no fund at all for fire?—None at all.

If your Beckton Gas-Works were burned down, what would you do?—[Witness returned no answer.]

Sir F. Dixon-Hartland having repeated the question, witness said: Parliament does not require us to do anything.

But as business men. In the case of a man who owned, say, the boats that were bringing coal, he would surely insure his property?—We are guided as business men by our past experience; and that tells us that the amount of risk of fire in connection with gas-works is absolutely *nil*.

Mr. Steadman: Have you ever, in the course of your whole experience, known a gas-works to be burnt down?

Witness: No.

I suppose it would be almost impossible?—Yes; we have men about the works all day long and all night as well; but still it is a risk which an Insurance Company would not take.

The Chairman: The risk, you say, is a very small one. But the point I wish to make is: What could induce the Insurance Companies to ask what you call a "prohibitive" premium for gas-works? How is it that you can contend that the risk is small in the face of the attitude of the Insurance Companies?

Witness: Well, we know better than they do all about the risks. We can go back a hundred years in the history of gas undertakings. We do not think that there is anywhere a record of a gas-works having been destroyed by fire or having been seriously injured.

But it is a very strange thing that the Insurance Companies should hold such an opposite view as to make the premium prohibitive.

Sir F. Dixon-Hartland: What I want to know is, why do you not put anything to an insurance fund when you are your own insurers? Surely that is done in every business?—The interest which accrues according to the table which I have put in is equivalent to the Company, placing something to the insurance fund.

The Chairman: You have said that £39,000 has been used?—We start now with a capital sum, on Dec. 31, 1898, of £81,290. In this matter we are all governed by the question of probabilities.

Do you carry the interest on the reserve fund always to the fund?—Yes. If we exercise the power Parliament has given us, it would amount to £90,000 a year, which is more than 1d. per 1000 cubic feet of gas used. In respect to the small risk attaching to gas-works, I do not think we should be justified in taxing consumers another 1d. per 1000 feet for protection of that kind.

What do you mean by "power Parliament has given you"?—Why, I mean we may carry 1 per cent. to the insurance fund under the Act out of income.

But you do not do that because your experience tells you that it is unnecessary?—Yes; that is our experience, and that of other companies is the same.

The Chairman said that, as it was evident that the witness could not finish his evidence that day, it would be well that he should suggest a point at which he could leave off.

Witness said the next point he would have to deal with would be one of importance, occupying considerable time—namely, that bearing upon the electric light competition.

The Chairman: Perhaps it would be as well that Sir James Rankin should be in his place when that subject is gone into.

The Committee then adjourned.

Extensions at the Worthing Gas-Works.—The Worthing Gas Company have lately had to consider the question of additional storage capacity, owing to the increasing demand for gas; and they have decided to add a third lift to two of their holders. The subject of further scrubbing power has also been reported upon by the Company's Engineer and Manager (Mr. W. A. Walker), with the result that it has been decided to double the height of the existing scrubbers. The work has been placed with Messrs. R. Dempster and Sons, Limited, of Elland; and it will be carried out under Mr. Walker's supervision.

An Agreement for the Purchase of the Morecambe Gas-Works.—At the meeting of the Morecambe District Council yesterday week, the Gas Parliamentary Committee reported that arrangements had been made for the withdrawal of the opposition of the Council to the Gas Company's Provisional Order, and for the purchase of the gas undertaking. The Council are to promote a Bill next session for the acquisition of the works; the Company agreeing not to oppose the application. The price will be fixed by arbitration, with 10 per cent. added for compulsory purchase. The services of the Manager, Mr. Duff, are retained until Dec. 31, 1905; and all servants of fourteen years' standing at the date of the execution of the agreement are to be entitled to the usual statutory pensions, unless their services are retained by the Council

THE CONTEST FOR THE DERWENT WATERSHED.

Continuing our record of the proceedings before the House of Commons Committee on the Derby, Leicester, and Sheffield Water Bills from the point reached last week, when the Chairman (Sir John Brunner) announced, on the 6th inst., that the Committee were prepared to pass the preamble of the Bills subject to the opposition of independent petitioners, the next event was the announcement by Mr. Pember, on behalf of the Duke of Devonshire, that a practical agreement upon all essential points had been arrived at between his Grace and the Corporation of Derby, which would, in the ordinary course, have been embodied in the Joint Bill; and he desired to know whether this would be done. Mr. Pope on behalf of Leicester, Mr. Claude Baggallay for Sheffield, and Mr. Pember for Nottingham, expressed their willingness to adopt the agreement. Mr. Pembroke Stephens, for the County Council of Leicestershire, said the terms read out by Mr. Worsley Taylor, if adopted, would really dispose of the whole matter. The moment they got to the allocation of water, the question was one which affected other people than the promoters. He represented a Company very much interested in the division of the water; and he would submit his case against the preamble on the Consolidated Bill. Mr. Reader Harris, on behalf of the county of Nottingham, said he would accept what had been stated. Mr. Erskine Pollock, for the Duke of Norfolk, pointed to the difficulty there was of dealing with this matter in the absence of a definite plan. He said the noble Duke would give his best consideration to the arrangement come to between the three promoters. Water would be taken from one part of his estate for the good of another; and as Sheffield would be benefited, and as it was in accordance with the ancient traditions of his family to do all that was possible for the advancement of the interests of Sheffield, he should not object to this. The works might render Derwent Hall uninhabitable, in which case the promoters ought to purchase the property. There were two alternative proposals—one for two reservoirs and another for three; and as he did not know what the effect of the one or the other would be, he should like to have an option either to retain or sell the property. Mr. Baggallay said Sheffield desired to know the course the noble Duke would adopt. They recognized his public-spirited way of acting. On behalf of the Lord Mayor of Sheffield and of the Water Committee, he (Mr. Baggallay) desired to say that Sheffield was quite ready to meet, so far as it possibly could, his Grace's views in regard to the Derwent Valley water. Mr. Hans Hamilton expressed himself similarly on behalf of Rotherham. The Chairman said he took it that there was no opposition in good faith to the preamble of any of the three Bills. Mr. Pembroke Stephens said his was as to preamble. Evidence should be taken as to apportionment.

Mr. E. M. Eaton, Water Engineer to the Corporation of Sheffield, then gave evidence as to the possibility of Nottinghamshire and Leicestershire obtaining a large supply of water in future from the Bunter beds, which would not, he said, be interfered with by the operations the Corporation desired to carry out, except within a very limited radius, so that the underground waters would be still available for the supply of the county of Nottingham. Professor Boyd Dawkins gave corroborative geological evidence as to the lie and water-bearing capabilities of these beds. In the course of conversation which arose out of the cross-examination of the witness, Mr. Pope remarked that, as the arrangement stood, the question of the supply of Chesterfield was left to the Joint Board. Mr. Macmorran said if the present Committee were to decide that Derbyshire should be allotted 5 million gallons, he should ask them to say that it should be altogether exclusive of any supply needed for the Chesterfield district, because the quantity named was required for the county of Derby, and a supply for Chesterfield could not be afforded out of it. Mr. Baggallay said Sheffield was quite willing to abide by the terms of agreement under which the matter was to be left to the Joint Board. Eventually, the Committee adjourned until the next day, to allow Derbyshire to consider certain propositions from Sheffield.

On the re-assembling of the Committee on the 7th inst., Mr. Macmorran said the Derbyshire County Council had come to an arrangement with the Sheffield Corporation, which was explained by a letter from the Town Clerk of Sheffield, which he read, as follows: "I am directed to inform you that the Sheffield Sub-Committee are unable to accept the first suggestions contained in your letter—namely, that the whole of the Rother watershed other than the part comprised in the district of the Joint Board should be supplied out of the water to be allocated to the county of Derby under the heads of arrangement. The Sub-Committee are, however, willing to accept your alternative proposal—namely, that the question as to the water from which the Rother watershed shall be supplied should be left to the decision of the Joint Board from time to time as demands may be made upon it for supply from that watershed, but that either the County Council or Sheffield, if dissatisfied with the decision of the Joint Board, should have a right of appeal to the standing Arbitrator to be appointed under the proposed Act." Counsel added that the terms, so far as they affected the County Council, were as stated in paragraph 4 of the Heads of Arrangement (*ante*, p. 1577)—viz., "15·15 per cent. of the available water to be reserved for the county of Derby on the terms of the Derby Bill." Mr. Baggallay remarked that this put an end to the matter as between Sheffield and the county of Derby. Mr. Rickards (for the Chesterfield Rural District Council) asked to be allowed to supplement what Mr. Macmorran had said. He read out the terms of the arrangement come to with the promoters of the Joint Bill and Chesterfield, to the effect that the Chesterfield Gas and Water Board and the Chesterfield Rural District Council would not oppose the preamble of a Joint Bill on the lines of the arrangement come to by the four Corporations, provided such Bill contained a provision that each of them shall be empowered to require a supply of water from the Joint Board, such supply to be limited in the case of the Chesterfield Gas and Water Board to not less than 20 gallons per day per head of the population for the time being within the district of the Board, and in the case of the Chesterfield Rural District Council to not less than 15 gallons per day per head of the population. The two Authorities had no objection to the proposal that the water to be supplied should be afforded out of the amounts respectively allocated to the Sheffield Corporation and the county of Derby, and in such proportions as the Joint Board might determine. The Chairman expressed the hope that the clauses embodying these agreements would come before the Committee as agreed clauses. Mr. Macmorran said he had no doubt about it. Mr. Baggallay thereupon stated that, under these circumstances, the Sheffield case was closed.

Mr. Balfour Browne then proceeded to open the case for the Corporation of Leicester. In doing so, he said that whereas Sheffield and Derby were looking forward, as they had a perfect right to do, to a supply of water a long way ahead, the wants of Leicester were at the present time absolutely urgent. They could not afford to wait or to look forward to a supply in the future; they must have water, and at once. The population of the borough was 213,851; and the population within the water limits of the Corporation, 250,000. Having regard to the large number of thickly-peopled places in and around Leicester, covering an area of about 60,000 acres, its necessary supply, calculated on the lowest possible basis, was the 10 million gallons a day allotted to them under the arrangement, which would only give sufficient water for forty years; and when it was stated that Leicester had to go a distance of 67 miles for the purpose of getting this quantity of water, he did not believe anyone could say that they were making undue provision for the future. The water supply of Leicester was now derived from three reservoirs, situated almost in the immediate vicinity of the gathering-ground, which was mainly agricultural land, subject to high farming, and containing a very considerable population. He did not wish to say a single word to alarm the people of Leicester; and, therefore, although Sir Edward Frankland was present, it was not proposed to call him for the purpose of giving evidence as to the suspicious character of the present supply, because the people would have to use it, at any rate for some time to come. With regard to quantity, Leicester, which was now supplying 4⅓ million gallons a day, was at the end of her tether; and therefore, both as regards quality and quantity, a fresh source was urgently required. No one disputed these facts; and the only opponents they had to face were the Leicester County Council, who desired to have a supply of 2 million gallons a day, which the town could not afford to give out of the 10 millions allotted to them.

Mr. J. B. Everard, Water Engineer to the Corporation of Leicester, gave evidence bearing out the opening statement of Counsel. He put in tables prepared by Messrs. Alfred Lass, Wood, and Co., and said that on the basis of 25 gallons per head per day the 10 million gallons allotted to Leicester under the joint scheme was the very least they could do with, and would leave them no margin for supplying anyone else. The Bill was drawn up in a friendly spirit towards the Leicester County Council, with the view of giving them all the assistance possible consistently with the absolute necessity that the wants of Leicester itself should be first of all supplied. Mr. Pembroke Stephens cross-examined witness on behalf of the Leicester County Council, to show that the Corporation were bound, in the negotiations with the other towns, to insist upon the claim of the county to get 2 million gallons of water under the scheme, in addition to the 10 millions allocated to the town. Asked whether the Corporation had not always recognized the claim of the county to 2 million gallons of water a day, witness said this was through excessive benevolence. Mr. Freeman remarked that the county were proving themselves very ungrateful. In re-examination, he elicited from witness the information that although there were no fresh local sources within the county suitable for the supply of a large town like Leicester, there were some from which smaller places in the county, such as Loughborough, could obtain further supplies. While the Corporation of Leicester were ready and willing to hold out a helping hand to the county, they had always been firm as to the absolute necessity of having 10 million gallons a day for Leicester. In the course of the evidence, the Chairman said he considered that Leicester had been greatly remiss in looking forward to the probable wants of her population. Witness asked to be allowed to give an explanation upon this point; but Counsel advised him not to do so. Mr. Freeman then said he did not propose to offer any further evidence on behalf of the Corporation of Leicester, unless the Committee desired it. The Chairman said the Committee did not ask Counsel to offer any further evidence; but if he deemed it advisable to do so in view of what had been said on behalf of the two counties of Leicester and Nottingham, the decision rested with him. Counsel thereupon said he would call one other witness. Mr. G. F. Deacon then gave corroborative evidence as to the needs of Leicester, and as to the impossibility of their giving up a single gallon of the 10 millions they had agreed to accept.

On behalf of the Leicester County Council Mr. Pembroke Stephens called Dr. Thomas, Medical Officer of Health for Loughborough and the county of Leicester, who said that, having taken 800 samples of water at different places in the county, he had come to the conclusion that a very small proportion of them were suitable for domestic purposes. Some of the Local Authorities had endeavoured to obtain supplies from deep wells, but none of them had been successful. Obtaining water from shallow wells was attended with considerable risk; and in view of the generally unsatisfactory character of the water throughout the county, applications had been made to the town to furnish a proper supply. The Chairman remarked that if the population of the borough increased hereafter in the way that had been prophesied, there might be but little water to spare for the rest of the county towards the end of the time; but if, on the other hand, the influx of population to the town should come to an end before 1940, then the quantity to spare for those outside the borough would be considerable. Mr. Pembroke Stephens asked witness whether it was not the case that the growth of the districts outside Leicester had been retarded by the want of a proper water supply. Witness replied that it was. Mr. Balfour Browne said if it would satisfy his learned friend, he would extend the Leicester limits of supply from 10 to 15 million gallons on the condition that the borough should have first claim to 25 gallons per head per day. If this would not satisfy him, he would not give him anything. The Chairman said he had given a strong hint of the value of this concession in his mind. Mr. Pembroke Stephens said there were other matters to be considered; and he asked the witness, in conclusion, whether, in his view, there was not an absolute need for the provision of a proper supply of water for the county of Leicester at the same time as for the town, and whether the present was not the proper time to obtain it. Witness assented to this proposition; and added that, on the basis of only 15 gallons per head per day, the population of the districts outside the borough were in urgent and immediate want of 1,789,000 gallons a day.

Mr. Pembroke Stephens, addressing the Committee on behalf of the county of Leicester, contended that as the borough had exhausted the local sources of supply properly belonging to the county, the latter had a just claim to a domestic supply from any new source. The Chairman remarked that it was a fair argument for presentation to the Committee that, the domestic needs of Leicester being satisfied, she ought not to obtain a trade supply from a new source to the detriment of the domestic supply of places outside the borough. Mr. Pembroke Stephens submitted that there ought either to be reserved for the outside districts a definite quantity of water, not exceeding 2 million gallons a day, which would be the simplest and most satisfactory way of meeting the claims of the outside districts, or the 25 gallons per head per day of preferential supply to Leicester should be limited to a figure approximating to the actual domestic consumption of the day in Leicester, excluding trade supply; or, thirdly, the question of trade supply, as between the borough and the county of Leicester, to which the Chairman had alluded, should be referred to arbitration.

Mr. Reader Harris then addressed the Committee on behalf of the Nottinghamshire County Council. He said he appeared against the three Bills, but he had not gone into the Leicester case, as it stood on a different footing certainly to one of the other parties to the joint scheme. He contended that the proposals in the arrangement between Leicester, Derby, Sheffield, and Nottingham were unjust, and should not be sanctioned, and he went at once to what he believed to be the *crux* of the question—viz., that the allocation, arrived at behind the backs of the Nottinghamshire County Council, was utterly and entirely unfair. Roughly, the figures were as follows: Derby was to have 7 million gallons; Leicester, 10 millions; Sheffield, 7 millions; Nottingham, 4 millions; and Derbyshire, 5 millions. There was no doubt that Leicester had a real need for water, and Derby had some need, perhaps; but Sheffield had no need whatever. They admitted that they had a sufficient supply to last them for something like twenty or thirty years. The arrangement would result in denying to the county of Nottingham the water it sorely needed. What was the remedy? There was a simple one to the hand of the Committee, and that was to reduce the amount of water proposed to be given to Sheffield—or to any other town, so far as that went; but it was borne in on his mind that Sheffield was the place which was applying for the most excessive amount. He would ask the Committee to make the arrangement come to between the Nottinghamshire County Council and the Derby Corporation apply as between the former and the parties to the joint scheme. He submitted that the large population of the county of Nottingham should not be left as the Joint Board proposed to leave them—to their present supply. They had a right to water from the Derwent—a prior right to anything Sheffield could show, because the need was a present one. Counsel concluded by declaring that, in including Newark, the county would ask for 3 million gallons a day from the Derwent.

Mr. C. T. Wright, Chairman of the Health and Sanitary Committee of the Nottinghamshire County Council, said he had given his attention to the water supply of the county, and had come to the conclusion that it was insufficient. It had been shown at previous inquiries that many private wells in the county were dry; that public wells which used to furnish 3 million gallons of water were now only supplying 2 millions; and that the normal level of the deeper wells had fallen considerably. The supply was decreasing, while the demand was increasing.

This closed the proceedings for the day.

Mr. Wright was re-called the following morning, and was further examined in regard to the Bunter bed formation near Doncaster; and he expressed the opinion, as an engineer, that there is a large supply of water lying almost immediately under the town. In cross-examination by Mr. Baggallay, he said he was not aware that any of the water authorities in the county of Nottingham had asked the Council to take the action they had done; but they knew that the population under these authorities had stated over and over again that they were wanting water. There were the districts of Mansfield, Hucknall Torkard, Newark, Kirkby-in-Ashfield, and Sutton-in-Ashfield—all populous places—which were included in the 257,000 population outside the 300,000 within the Nottingham water area. These five places had their own water supplies. He was not aware that these authorities were opposing any of the Bills at the present time. They opposed, in 1897, when Nottingham wished to appropriate three wells in the county, and they successfully resisted the sinking of two out of the three. These two wells were refused because it was known that those existing were pumping the area dry. It was not the fact that the water was reserved for the county districts. There was no water to reserve, as it had all been taken up. After some further cross-examination, witness said the County Council were quite unanimous upon the point that they were entitled to a certain share of the Derwent water. The minimum quantity named by the Council was 2 million gallons a day out of the 33 millions. Where it should come from they had not considered; but they certainly thought Sheffield was the least entitled to the water of any of the parties. Mr. Baggallay asked witness whether he would be glad if the effect of the decision that the Council were to have a certain quantity of water allocated to them were to upset the whole scheme, so that nobody would get any water at all. He said he should prefer that to the proposed arrangement. They were perfectly satisfied with their original agreement with Derby; but if a certain quantity of water were allotted under the Bill, they could take it from the Nottingham mains at the points nearest to the places where it was required.

The next witness was Mr. W. H. Radford. He said he lived in Nottingham, and knew thoroughly the district about which the Committee were inquiring. He acted professionally for a large number of the local districts. Asked what was the need of Nottinghamshire for water, he entered into a long explanation by the aid of a geological map. He submitted that the whole of the area between Nottingham and the Mansfield Railway, which was over the Bunter beds running through the centre of the county, was fully occupied by wells. All over this area the water-level was gradually lowering at an average of 2 feet a year. As about this depth of the porous sandstone would hold about a year's percolation, the position was that they were not only pumping out all the available water, but taking twelve months of the old accumulation every year. They were taking double the amount which was properly available. This state of things must come to an end. He did not see any difficulty in carrying out the recommendation of the preceding witness, that, on the demand of their County Council, the Corporation of Nottingham should supply outside districts with a certain quantity of water at a given price. If the outside districts had power to tap any of the Corporation's mains capable of bringing the supply up to the maximum allowed by the county, there would be no difficulty in doing it. The Council should have power to say who required the water, and should be able to allocate it, subject to the approval of the Local Government Board. They thought the water should come from the quantity Sheffield claimed. Following Mr. Radford came Dr. Handford, Medical Officer of Health, who gave evidence as to the water needs of the various Local Authorities who were most anxious as to the character of their existing sources of supply, and had asked the County Council to protect their interests in connection with the proposals before the Committee. Lord Belper, Chairman of the County Council, was then called. He said they had the whole of the county at their back in the course they were taking. They supported the Derby proposals because they considered that Derby and Derbyshire had the first claim to the water of the Derwent. Terms satisfactory to the county of Nottingham were agreed to with Derby; and it was understood that if a joint scheme were settled with Leicester, the arrangement with Nottinghamshire should be maintained. Now this was all put an end to by the quadruple agreement between Sheffield, Derby, Leicester, and Nottingham, and the county found themselves left out in the cold. Having spoken of the unsatisfactory character of the supply of water from the Bunter beds, and as to the probable large increase in population in the county, the Council asked that if the whole of the available supply of water was to be allotted to different Corporations, 2 million gallons a day should be given to the county of Nottingham, thereby enabling them to carry out their agreement with other people. He considered that, as regards claims to the Derwent watersheds, Derby and Derbyshire came first, Nottingham and Nottinghamshire next, and then Leicester and Leicestershire—all before Sheffield. He did not consider that the position of Nottinghamshire was so secure that they would be justified in giving up their claim to a share of the waters of the Derwent watershed. Mr. Pope, on behalf of Leicester, cross-examined witness in support of the contention that those who found the capital for carrying out the water schemes had the first claim to the water. In reply to the Chairman, witness said as County Councils could not come to Parliament, he felt that, on considering a general scheme of water supply, a Parliamentary Committee should help those who could.

This concluded the case for the Nottingham County Council.

Mr. Reader Harris then addressed the Committee on behalf of the Corporation of Newark in support of the Derby Bill as originally introduced, and against the proposed joint scheme, which would, he said, have the effect of putting an end to the agreement which had been come to between Newark and Derby. He therefore asked for protection at the hands of the Committee. The Chairman pointed out that the Committee could not enforce any agreement upon Derby. Mr. Harris admitted this; but he said Newark asked that in the allocation of the water the town should not be lost sight of. If the Committee granted the request of the Nottingham County Council for 2 million gallons of water a day from the Derwent Valley, the Council were willing to agree to half-a-million gallons a day for Newark.

The case of the Fine Cotton Spinners' and Doublers' Association, who claimed compensation in water and money for any loss they might sustain, was then considered, and the Committee adjourned.

On the resumption of the inquiry on the 9th inst., the Committee were at first engaged in considering the claims of millowners and others to compensation. When these had been arranged, Mr. Pope offered some remarks in opposition to the demand of the Leicester County Council that they should have a specific share of the Derwent water allocated to them under the joint scheme. Mr. Littler followed on behalf of Sheffield, and commented upon the terrible results which must ensue if the position of equilibrium which had been arrived at after all the circumstances of the case had been weighed in the balance, were disturbed in such a way as to endanger the whole scheme. Sheffield had already made a very handsome concession, by agreeing that Chesterfield should be supplied out of her share; but she could not possibly admit a similar claim on the part of the county of Nottingham. It was only by the pressure of the Committee that Sheffield had been enabled to get a foothold in this watershed; but, having obtained that foothold, she maintained her right to the share allotted to her under the terms of the arrangement.

The members of the Committee then retired for the purpose of deliberation. On their return, they announced, as mentioned last week, that they had considered the preambles of the three Bills, and, subject to the omission of any statements inconsistent with the objects of the Consolidated Bill, they found such preambles, as amended, respectively proved. They then adjourned till last Wednesday, when the Consolidated Bill was brought up, and the clauses considered.

On the re-assembling of the Committee last Wednesday, the Consolidated Bill was submitted to them, and its chief provisions explained by Mr. Baggallay. It provides for the constitution of a Joint Board, to be named the Derwent Valley Water Board, to consist of thirteen members—three from Derby, four from Leicester, three from Sheffield, two from Nottingham, and one from the Derby County Council. At the first meeting of the Board each year, a standing Arbitrator is to be appointed to determine the questions submitted to him under the provisions of the Act. Part IV. of the Bill relates to the execution of the works, some of which were those shown on the plans and sections of the Derby Bill; others are those of the Leicester Bill; and the rest are those of the Sheffield Bill. Provision is made for the appointment of two persons to ascertain the rainfall for the purpose of calculating the amount of compensation water. They are to be nominated by the President of the Institution of Civil Engineers, if not named in the section. The time for the completion of the Ronksley and Howden reservoirs to be ten years, and for the Derwent reservoir fifteen years. In clause 89 power is given to the Board to enter into contracts, and to give effect to them, with regard to supplying water in bulk to various Local Authorities and persons. This will enable the Joint Board to sell the surplus water, and get some return for it pending the time required for the supply of the Authorities.

After some discussion, the Chairman announced that the Committee found the preamble of the Bill proved.

The clauses were then proceeded with; the Committee dealing first

with those relating to pipes and the alternative of cut-and-cover. The position taken up by Derby was that both systems were necessary. The Derbyshire County Council explained through their Counsel, Mr. Rickards, Q.C., that they were little concerned in the matter, except that if cut-and-cover were adopted it should be impervious. Evidence was given by Mr. J. B. Everard, the Engineer to the Leicester Corporation, in favour of cut-and-cover, because of its comparative cheapness, and the difficulty of Leicester obtaining water from the proposed Derwent reservoir by pipes. Mr. Marshall, on behalf of the Duke of Devonshire, said his Grace had no feeling as to whether the water should be conveyed by cut-and-cover or by pipes. He left the matter to the decision of the Committee. Mr. Waite, the Chairman of the Derbyshire District Councils' Association, said he was in favour of the cut-and-cover system proposed by Leicester, mainly on the ground that it would avoid many miles of roads which were very narrow. Mr. W. B. Bryan, Engineer of the East London Water Company, and Consulting Engineer to the city of Nottingham, spoke in support of the cut-and-cover system, which he regarded as both economical and comparatively free from risk. He had no engineering objection to having both cut-and-cover and service-pipe systems in the Bill. Sir F. Bramwell also gave evidence in favour of the cut-and-cover system, so far as the Bill was concerned. He thought it much better that the question should be determined by the Committee than that it should be left to the Joint Board. The two systems could not be used together. Mr. G. F. Deacon gave similar evidence.

The Chairman at this point informed Mr. Worsley Taylor that he had made clear to the Committee his desire to supply the Crich reservoir, and that he could not do it by the cut-and-cover system. He asked Counsel to explain to the Committee why they should not allow a pipe from the Ronksley reservoir to Crich, and insist on cut-and-cover for the rest of the water. Mr. Worsley Taylor said that engineering evidence would be needed on the point. The circumstances of Derby were not those of either Leicester or Nottingham. They had large reservoirs, and if anything went wrong, they could go on for a fortnight. If Derby were limited to a supply by cut-and-cover, she would "have all her eggs in one basket," so to speak, and if anything went wrong with that "basket," the whole of her water supply would be interfered with. Of the total supply, 2 million gallons came from the Crich reservoir. Of course, they were dependent on that for the supply of the high places. It might well turn out that it would be convenient that certain districts should be supplied by cut-and-cover and others by pipes. The Joint Board might decide that the supply of Leicester and Nottingham might be given by cut-and-cover. But a supply of small dimensions—the Derby supply of 10 million gallons—might go by pipes. There was serious objection to cut-and-cover, because they would have to construct works which they did not want. They would carry out works for 30 million gallons, which would not be wanted; but a smaller quantity could be brought by pipes. If they eliminated the pipes from the choice of the Joint Board, they would take away the chance of supplying a small quantity of water in the manner he proposed. The Chairman asked Counsel to confine his case to showing cause against this, which the Committee had in their mind; but he had not decided that pipes should be allowed for the Crich reservoir, and that the rest should be cut-and-cover. This closed the proceedings for the day.

The next morning, the cut-and-cover question was again debated—the Derby Corporation opposing the suggestion of Leicester that the Derwent water should be carried by the above-named system instead of by pipes. Mr. Charles Hawksley was called, and said that, in his opinion, both cut-and-cover and pipes should be retained in the Bill. Asked what would be the effect if the Joint Board were limited to cut-and-cover only, witness said that, if they were, the supply to the borough water area of Derby and to the Derby Corporation would be liable to interruption when the cut-and-cover was turned off for repairs; and such interruption might continue for at least a week. In the case of Leicester, they had large reservoirs near home from which they no doubt could obtain water during a temporary interruption of the supply from the Derwent; but neither Derby town nor Derby county had such reservoirs. After some further evidence, Mr. Worsley Taylor put this question to the witness: "From your point of view, you say, as responsible Engineer for Derby and Derbyshire, that it is necessary for your proper supply that you should have pipes, and that if Leicester wants cut-and-cover she can have it?" Witness said it was, and that pipes of reduced size could perfectly well be put on the roads; but Derby could not compel the Joint Board to lay them unless there were a majority for so doing, or unless the Arbitrator appointed under the Bill were of opinion that the Board ought to lay pipes. Asked by the Chairman if he would propose that Derbyshire should be shut out from the use of cut-and-cover, witness said he would not; he would leave the Board with perfect freedom to do that which from time to time might be desirable. The Board would have to administer waters which would not be used up completely for thirty or forty years; and many circumstances might arise within that time which it was impossible to foresee now. The Chairman said he wished Mr. Hawksley to put before the Committee a definite proposal for two lines of pipes, with a limitation of their diameter to be left optional with the Board. Witness said he would propose that a proviso should be inserted in the Bill that the Board should not be empowered to lay along the roads between Bampton and Ambergate more than two lines of pipes, neither of which—if the Committee insisted upon a limitation of their size—should be larger in diameter than (say) 44 inches. After some argument, the Chairman said the Committee had decided on having only one pipe, but unlimited in size. Subsequently, Mr. Ram suggested the insertion at the end of the clause relating to the pipes of a proviso that the Board should not, in the exercise of the powers of the Act, lay more than one line of pipes in any one road north of Ambergate. Mr. Freeman, for Leicester, intimated that the suggestion did not meet his views, as it would admit of the laying of an alternative line of pipes between Ambergate and Howden in competition with the cut-and-cover; and in all probability this would wreck the Bill on Standing Orders in the House of Lords. Mr. Ram argued in favour of the adoption of his proviso, and asked leave to call further evidence on the point; but the Committee were disinclined to hear it. The case of Mr. Leslie, a mill-owner, who asked that, in his exceptional circumstances, he should be entitled to more than the usual one-third compensation water, was then proceeded with. After deciding that Mr. Leslie had not made out a case for special compensation, the Committee adjourned.

The clauses of the Bill were further considered last Friday. It was announced that the Nottingham County Council, finding themselves unable to accept the offer of the Corporation of Nottingham to supply them with water in bulk, had determined to reserve their opposition for the House of Lords. Clauses were then brought up and ratified by the Committee providing for special terms of compensation to the Fine Cotton Spinners and Doublers' Association, and for carrying out the works for the supplying of the county of Derby in accordance with the previous decision of the Committee. It was further stated that satisfactory arrangements had been arrived at with the Dukes of Rutland and Norfolk. The Committee declined to accede to the claim of 20,000 gallons of water per day, free of charge, for the supply of the Chatsworth Estate; and decided that the Duke of Devonshire had no claim to be treated differently from the Dukes of Norfolk and Rutland. Clauses were framed for the protection of the Chesterfield Board and other parties; and the long inquiry was brought to a close.

Before separating, Mr. Littler, the leading Counsel for Sheffield, and the senior member of the Parliamentary Bar, said he was bound, on his own behalf, as well as on behalf of his learned friends, and everyone who had been engaged in the inquiry, to take a most unusual course, because this had been a most unusual case. They thought they ought to express their deep obligation to the Chairman and his colleagues for their services, for the very careful attention they had paid to Counsel and witnesses, and for the way in which they had met difficulties of a most unusual character, and settled them in a manner which, so far as his experience went, had not been equalled. He therefore desired, very respectfully, to thank the Committee for having solved what had been a very difficult problem for the benefit of the communities represented. Mr. Freeman, for Leicester, in the absence of his leader, Mr. Pope, expressed similar sentiments to those uttered by Mr. Littler, whose remarks the speaker asked to be allowed cordially to second; adding that Sir John Brunner and his colleagues had brought out of chaos a matter which was of the deepest interest to the localities concerned, and almost to the national life. Mr. Vesey Knox, representing Derby, having endorsed these expressions of thanks, Sir John Brunner, in reply, said it had been a source of great gratification to the Committee to hear what had fallen from the learned Counsel. They hoped very sincerely that the efforts they had put into their work to meet public satisfaction might be realized.

Winding up the Bridlington Water Company.—The shareholders of the Bridlington Water Company have passed resolutions in regard to the division of the funds with which they find themselves possessed on the completion of the purchase of the undertaking by the town. For every £10 share, payment is to be made at the rate of £34. The Secretary (Mr. W. Lee) and the Foreman are to receive £75 each; and after paying the winding-up expenses (estimated at £200), the cash balance, about £450, is to be handed over to the Directors. The Liquidators are Mr. J. C. Archer, the Chairman of the Company, and Mr. Lee.

Littlehampton Water-Works.—At a recent meeting of the Littlehampton Urban District Council, the General Purposes Committee submitted a report dealing with the new water supply, from which it was gathered that the contract sum amounted to £3448. For various works not carried out £252 was deducted; leaving £3196. There was added for extra works duly authorized a sum of £233; making a total of £3429. The cash paid by the Duke of Norfolk was £3000; leaving a balance due of £429. It was pointed out that a saving of £18 had been effected between the actual cost of the works and the amount for which the contract was taken; and it was decided to pay the balance owing.

Pembroke Water Supply.—Messrs. Beasely, Sons, and Nicholls have in accordance with instructions, advised the Pembroke Water Committee as to the existing source of water for Pembroke, and have submitted to that Authority a detailed report. They recommend a covered service reservoir, to hold two days' supply, to be constructed on the site adjoining the present reservoir. From the reservoir a 6-inch main should be laid on a route particularized, and also new 3-inch mains at points specified. Other provisions are also recommended. The cost of the works, including, engineering, administration, and legal expenses, is put at £3500. At the meeting of the Committee, two members were deputed to confer with Mr. Beasely on the matter.

Foleshill and District Water Supply.—The completion of the first stage of the scheme for providing the district of Foleshill, Exhall, Sowe, Wyken, Stoke, Binley, Keresley, and Corley with a new water supply was signalized last Saturday week by a formal inauguration. The North Warwickshire Water Company was formed with the object of constructing works and maintaining a regular supply throughout the district; and within ten months from the acquisition of the necessary parliamentary powers, the scheme has been so far finished as to allow of the distribution of a supply among the inhabitants. The area to be served contains a population of 16,000. Applications have already been received for 800 services, and between 500 and 600 have been laid. The new supply was turned on by Mr. John Hollick, Chairman of the Foleshill District Council.

The Main-Laying Troubles at Ormskirk.—In the "JOURNAL" for the 9th ult., we recorded, under the above heading, some facts which showed that the relations existing between the Ormskirk District Council and the Gas Company were by no means amicable. The trouble, it may be remembered, arose over the reinstatement of roads after main laying, the location of pipes under footpaths, and the proposal of the Company's Manager (Mr. J. Martin) to use in a new street some perfectly sound mains removed from another part of the town. Mr. Martin has been accused of sharp practices and want of straightforwardness; and relations with him have been suspended. However, his Directors have passed a resolution expressing the fullest confidence in him. On the other side, the District Council have equal confidence in their Surveyor—another party to the squabble. Hard words have been used against Mr. Martin in the Council, where a suggestion was made that the subject in dispute was so serious that it should be brought before the House of Commons. This, however, was thought to be rather an irregular proceeding; so the matter is to be referred to the Local Government Board. Mr. Martin does not, unfortunately, seem to be in a very happy position at Ormskirk; for not only is his good name filched from him in the Council Chamber, but his goods are stolen by a dishonest domestic, who has just been committed for trial.

LEGAL INTELLIGENCE.

PRIVY COUNCIL OFFICE—Wednesday, June 14.

(*Before Lords* MACNAGHTEN, MORRIS, *and* DAVEY.)

The Petition for the Prolongation of the Inclined Retort Patent.

The petition of the Automatic Coal-Gas Retort Company, Limited, for an extension of the term of the letters patent, granted to A. M. Clark, No. 7563, of 1885, on a communication to him by André Coze, of Rheims, was considered by their Lordships to-day. In their petition, the Company submitted that, "in view of all the circumstances of the case, an exclusive right of using and vending the said invention for the further period of seven years will not sufficiently reimburse and remunerate your petitioners."

Mr. FLETCHER MOULTON, Q.C., Mr. A. J. WALTER, and Mr. J. H. GRAY appeared in support of the petition; the SOLICITOR-GENERAL (Sir Robert B. Finlay, Q.C.) and Mr. SUTTON represented the Crown.

Mr. MOULTON opened the case by stating that the invention was for "Improvements in Retorts for the Distillation of Coal and other Solid Matters, and in Apparatus in connection therewith." The letters patent were granted to Alexander Melville Clark, to whom the invention was communicated by André Coze, Director of the Gas Company of Rheims. It was numbered 7563, and bore the date June 20, 1885. Counsel described the invention as a very remarkable and peculiar one, and then at some length explained to their Lordships the method of producing gas in horizontal retorts commonly in use before the advent of the inclined system. He graphically showed how the laborious work connected with the charging of retorts was overcome by the Coze invention, how it secured an equability of the stratum of coal in the retort, and how it simply discharged itself by gravity. [By the aid of a model, the working of the system was demonstrated to their Lordships.] The substantial advantages of the system, continued Counsel, were shown by the fact that the Municipality of Vienna, who had recently taken over the gas concession in the city, were erecting no less than 3000 of these retorts; and Berlin was also taking them up very largely. He did not think he need go into the questions of the novelty of the invention or the validity of the patent. These points were tried before Mr. Justice Romer, in an action by the Company against the Salford Corporation, when the patent was sustained; and there was no appeal. Then, to further show how widely the usefulness of the invention was recognized, Counsel stated that it had been adopted by the following Companies and Local Authorities: The Gaslight and Coke Company, the South Metropolitan Gas Company, Brentford Gas Company, Burnley Corporation, Rochdale Corporation, Chatterley Chemical Company, Birkenhead Corporation, J. Hardman & Co., Coventry Corporation, Birmingham Corporation, Manchester Corporation, Oxford Gas Company, Middlesbrough Corporation, North-Eastern Railway Company, Leigh Local Board, Huddersfield Corporation, Hartlepool Gas Company, Newcastle-under-Lyme Corporation, Dartford Gas Company, Talk-o-th'-Hill Colliery Company, Salford Corporation, Todmorden Local Board, Leeds Corporation, Nelson Corporation, Batley Corporation, Dewsbury Corporation, Rotherham Corporation, Chesterfield Corporation, Cambridge Gas Company, Middleton Corporation. A patent of this kind, he continued, was slow in getting "on its legs." The gas companies and corporations having their retort-benches built on the horizontal system, could not, of course, pull them down immediately for the purpose of putting in the new method. It was only when there were replacements, extensions, or new gas-works that the system had much chance of being advanced; but the cost of manufacturing by inclined retorts was so much less that they were now fast making their way. Turning to the petition, Counsel quoted extensively from it. It pointed out that "a long trial of the mechanical and commercial merits of the invention had to be made before those interested in the gas industry would adopt the invention." It also stated that "it is calculated that, if the patented apparatus was used by all the London Gas Companies, there would be a saving on the working expenses of those Companies alone of something like £1,000,000 per annum." Proceeding, it was shown that "letters patent for the same invention were taken out in certain foreign countries;" but "no adequate remuneration has been derived from the foreign patents, and owing to the expense of maintaining the same the patents had been allowed to lapse." Counsel said in this particular he wished to correct the petition; the Austrian patent being the only one which had lapsed. The German patent was disposed of to a Company who had worked it very effectively; but the difficulties which existed in England with regard to the adoption of the system (which were partly commercial, and nothing to do with the invention) were greatly aggravated abroad by the custom of only giving concessions to gas companies for a limited time, and, when a number of years had run, it was not to the interest of the concessionnaires to spend capital, because whatever capital they spent passed over ultimately to the municipality. The succeeding clauses were read *in extenso* by Counsel, as follows:—

Up to the year 1890, the beneficial interest in the said letters patent remained in the hands of the inventor M. Coze; while Mr. A. M. Clark remained, until the assignment of the patent to the petitioning Company on the 19th of February, 1891, the registered owner of the patent. On the 20th of January, 1890, an agreement was entered into between M. Coze and Messrs. Morris, Terry, Van Vestrant, and Woodall, under which, in consideration of the sum of £280 paid to M. Coze and in further consideration of the right of M. Coze to share to the extent of 20 per cent. in any profits which Messrs. Morris, Terry, Van Vestrant, and Woodall might derive from the said letters, M. Coze granted to the said Messrs. Morris, Terry, Van Vestrant, and Woodall, an exclusive right to use, work, and dispose of the said patent.

Subsequently to the date of the said agreement, the said Messrs. Morris, Terry, Van Vestrant, and Woodall formed a Limited Company called the Coze Syndicate, Limited, with a capital of £10,000 in one hundred shares of £100 each, and the said Coze Syndicate, Limited, purchased the said letters patent, together with other patents taken out by the said M. Coze, for the sum of £6000 in cash, and 25 per cent. of any profits which might be made by the Coze Syndicate, Limited, on a re-sale of the property.

On the 10th day of June, 1890, the Coze Syndicate, Limited, entered into an agreement with one Walter Matthew Kight on behalf of a Limited Company then about to be formed under the name of the Automatic Coal-Gas Retort Company, Limited (the petitioning Company); and, by the terms of the said agreement, it was provided that the vendors should sell, and the proposed Company should purchase, *inter alia*, the letters patent in respect of which the present petition is presented; and it was by the said agreement provided that the consideration to be paid to the Coze Syndicate, Limited, for the purchase of, *inter alia*, the said letters patent should be the sum of £70,000 in cash, and 30,000 shares of £1 each in the proposed Company, such shares to be issued as fully paid up.

It was by the said agreement further provided that, unless before the 1st of August, 1890, at least 100,000 shares in the proposed Company's capital should have been taken up by responsible persons, either the vendors or the said W. M. Kight might by notice in writing rescind the agreement.

The petitioning Company was duly incorporated on the 1st day of July, 1890; but up to the 1st day of August, 1890, 3140 shares only had been applied for.

It was subsequently agreed between the petitioning Company and the Coze Syndicate, Limited, that, as there were no monies out of which the £70,000 cash which should have been paid to them under the said agreement of the 10th of June, 1890, could be paid, the members of the said Syndicate should apply for, and receive as fully paid up, 70,000 £1 shares in the petitioning Company, and the said shares so paid up as aforesaid together with a further 3000 shares were issued to the members of the Coze Syndicate, Limited; and, under this distribution of shares, the inventor M. Coze received 6750 shares in the petitioning Company, which are still held by him.

Before passing to the accounts, Mr. Moulton said there was one consideration he wished to put before their Lordships. It was, that patents and inventions differed enormously in the period of time they required in order to get them adopted. Fourteen years was the standard period; but fourteen years, it was not too much to say, was twice as long in the case of some patents as in the case of others. He could scarcely think of a type of patent which it would be more difficult to get adopted than this one. It required years of successful demonstration before people could be prevailed upon to put it into gas-works. In the first place, gas managers were very much averse to trying experiments, on account of the absolute necessity of always being able to regularly do their work. The circumstances of a gas-works were altogether different from those of a manufacturer, who, if a machine broke down, could at all events buy sufficient to meet his momentary requirements; but gas-works were bound to do their work from day to day without failure. In dealing with the question of prolongation, it was fair to consider this, that something like half the term of the patent expired in making real efforts to get the invention accepted, and with very little commercial success—practically none. But the corner had now been turned; and there was a prospect of good profit being made. M. Coze held 6750 shares; and he (Mr. Moulton) felt satisfied that their Lordships would agree that the inventor did his best to get the system accepted.

Lord DAVEY pointed out that this was not a case in which capital was introduced for the purpose of assisting a struggling patentee; but it was one in which a number of gentlemen had combined and bought, as a legitimate speculation, a patent for what it was worth, in order to work it as a commercial speculation.

Mr. MOULTON said what he urged was that the public had the benefit of what the Company had done in pushing this invention; if they had not pushed it, it might have laid dormant. It required an enormous amount of personal effort to get an invention like this adopted, although a good invention. Turning to the accounts accompanying the petition, he said it would be seen that the total receipts of M. Coze in respect of the English patent from 1885 to 1899 were £1923, and expenditure £628; so that he made a profit of just about £1300, or, to be strictly accurate, £1295. Regarding the foreign patents, in the first four years the inventor made nothing. Then, in 1889, he succeeded in selling the United States patent. He also obtained a little royalty from the Municipality of Berlin, and a first payment from the Stettiner Chamotte Fabrik Actien Gesellschaft of Germany on account of exclusive license for Continental patents. In 1890 and 1891, he got nothing; and then in 1892 he received a second payment from the Stettiner Company, who had continued to pay royalties right up to last year. Altogether the accounts showed that M. Coze had made a profit on these foreign patents of £1600. Coming to the connection with the patents of Messrs. Morris, Terry, Van Vestrant, and Woodall, Counsel said they paid M. Coze on account of the British patent £500, with a share in the profits. The patent was sold to the Coze Syndicate by those four gentlemen for £6000.

The SOLICITOR-GENERAL (interposing) said he believed a body called the Mercantile Agency intervened.

Mr. MOULTON said he thought not. Of course, the figures he was giving were simply cash, and did not take into consideration the question of shares. Coze's share in the profits on the re-sale was to be 20 per cent.; and this sum was evidently paid by the Coze Syndicate—£505 on March 4, 1890, and £502 on the 29th of that month. He also received 6375 shares.

The SOLICITOR-GENERAL said he was told that the books showed the two sums named were paid by the Mercantile Agency; and the agreement had not been produced between the Coze Syndicate and the Mercantile Agency.

Mr. MOULTON (proceeding) next dealt with the receipts and expenditure of the Coze Syndicate between Feb. 26, 1890, and Aug. 10, 1891. He said they received royalties from The Gaslight and Coke Company and the Birmingham and Birkenhead Corporations amounting to £718, a portion of which (£350) was paid to the Automatic Coal-Gas Retort Company—the petitioners—he presumed because they took the patent over from a particular date. But, on the other side of the account, was expenditure amounting to £987, as against the balance of the receipts—£387. In connection with this expenditure, he noticed the name of the Mercantile Agency; and he had no doubt they assisted in forming the petitioning Company. The Coze Syndicate only lasted about one-and-a-half years. Passing to the accounts of the Automatic Company, he said the loss on the first year's trading was £460, and on the second year £873. The third year there was a profit of £611, and the fourth year of £688. The fifth year (1894-5) there was a loss of £173; and the sixth year a profit of £95. Then in the year 1896-7 there was a loss of £1300; but in that year the law charges and expenses in connection with the Salford action were £1170, and the discounts and costs connected with the issue of debentures came to £2110. In the year ending September last, there was a profit of £2004. Therefore the net result of all the figures he had given was a profit of £8447, which he ventured to submit was not a sufficient profit for an invention of this importance, which produced a very

substantial saving to one of the largest industries of the world. The nominal capital of the Company was £250,000, of which only about three-fifths had been taken up; and part of the balance was allotted to the vendors and in payment of patents. Of course, the prolongation of the patent would give M. Coze a considerable interest as well as the petitioners, who had certainly done a service to the public in pushing the invention.

Mr. *Dugald Clerk* was called to prove the successful operation of the invention; but he had not proceeded far when

The Solicitor-General said they had looked into the invention; and they accepted Justice Romer's judgment as to its usefulness. But it was clear that the inventor was not now substantially interested in it; and certainly the accounts were not in a satisfactory state.

Their Lordships also intimated that they were satisfied as to the usefulness of the invention.

M. *André Coze* was then called; and he confirmed, through an interpreter, the portions of the opening statement of Counsel referring to his connection with the patent and the Company.

The Solicitor-General read correspondence which had passed between the Company and witness in reference to the present application; and in one letter the latter stated that he did not see why he should intervene in the matter, as the patent was no longer his property. Witness admitted that he had only taken an interest in the application at the request of the Company.

In re-examination, he said the accounts so far as they referred to him were, to the best of his belief, correct.

Mr. *W. W. Futcher*, Chartered Accountant, who prepared the accounts for the purpose of the application, testified as to their correctness.

Mr. *J. H. Sheldrake*, the Chairman of the petitioning Company, stated that the patents of Messrs. Morris and Van Vestrant which the Company also held were ancillary to the original patent. The whole system depended upon M. Coze's patent.

Cross-examined: He had no personal knowledge of the transactions which preceded the formation of the present Company.

By Lord Davey: The item of £1170 law charges and expenses in connection with the Salford case was in addition to the taxed costs that were allowed.

Mr. Moulton, again addressing their Lordships, urged that fundamental inventions of this kind ought to have a longer period allowed to them than usual. There were many adjustments and subsidiary arrangements required which could only be determined and produced by actual practice; and therefore time was required to perfect the system. The history of the Company was shown by the cash accounts; and it was there seen that the shares had not been of any value to the holders. The invention had been pushed, and by clever hands; and the net profit was only about £8000. There was no question as to the Company having taken large sums from the public; they had practically taken nothing. Under all these circumstances, in his opinion the prolongation was merited.

The Solicitor-General submitted that the application was made on behalf of assignees, and that an assignee stood in a different position from a patentee. In support of this, learned Counsel quoted the decisions of their Lordships' Court in the cases known as Hopkinson's patent and Norton's patent. In the present instance, he contended that the patentee had taken no real interest in the application. It was true that, at the request of the Company, he gave in correspondence all the information he had; but he expressed himself in a way which showed that his interest was of the very slightest. In the first place, the patent was sold by M. Coze to the four gentlemen who had been mentioned. They sold it to the Coze Syndicate, who appeared to have sold it to the Mercantile Agency. Then this Agency seemed to have sold it to a Mr. Kight, after which the present Company was formed, which appeared to be a fair commercial venture. The accounts, however, were in such a state that it was impossible to dissect them, so as to see what really related to the patent. Their Lordships had laid it down on more than one occasion that it was the duty of patentees or holders of patents to keep accounts which would show clearly the receipts and expenditure with reference to a particular patent. He submitted that these were matters for their Lordships' consideration before deciding upon a prolongation of the patent.

After deliberating in private,

Lord Macnaghten, in pronouncing the decision of the Court, said they were unable to recommend a prolongation of the patent. There were several objections to it, any one of which would probably be fatal. In the first place, the patentee had practically no interest whatever in the prolongation of the patent; whatever he might get by its prolongation would be very small indeed. The Company entered into this as a speculation; and it had been an unfortunate speculation. Because their speculation had been unsuccessful was no reason why the patent should be prolonged. The accounts which had been presented were certainly most unsatisfactory. It had often been laid down that companies coming for a prolongation of patent ought, from the first, to keep their accounts in such a manner that the profit they made would be quite clear to the Court. Under all the circumstances, they must refuse the application.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Tuesday, June 13.

(*Before Mr. Justice* Stirling.)

Grand Junction Water-Works Company v. Hampton Urban District Council.

In this case, a question arose as to the payment of the costs of the action, which had been heard and dismissed by the Court. It was brought to obtain a declaration that the plaintiffs were entitled to erect an engine-house and any other buildings they might think proper for the purposes of their undertaking upon certain land belonging to them within the defendants' district without the consent of the latter; and the question in the action was whether the Court would interfere by way of declaration of right in a case where the Legislature had (as here) pointed out a mode of procedure before a Magistrate as applicable for the determination of the matter in dispute.* The action having been dismissed with costs, the question arose upon taxation whether the defendants were entitled to such costs as between solicitor and client, or only as between party and party. This turned upon the consideration of section 1 of the Public Authorities Protection Act, 1893, which provides that "where, after the commencement of this Act, any action, prosecution, or other proceeding is commenced in the United Kingdom against any person for any act done in pursuance or execution, or intended execution, of any Act of Parliament, or of any public duty or authority," certain provisions should have effect. One of these was that wherever in any such action a judgment was obtained by the defendant, it should carry costs to be taxed as between solicitor and client.

Mr. Leese, for the defendants, contended that the present action was within the section; and he cited cases in support of his argument.

Mr. R. C. Glen, for the plaintiffs, maintained that the action was brought for a declaration of right, and not for any act done by the defendants within the meaning of the statute.

Justice Stirling said that, in substance, this was an action commenced against the Local Authority "for an act done in pursuance or execution, or intended execution, of an Act of Parliament." It was not brought to decide an abstract question, but to ascertain whether the defendants would be right or wrong if they took proceedings before the proper tribunal, as they had threatened to do. In his Lordship's opinion, the case fell within the provisions of the section; and the defendants were entitled to their costs as between solicitor and client.

* See "Journal," Vol. LXXII., p. 381.

Extension of the Tavistock Gas Company's District.

A petition was presented to his Honour Judge Woodfall, at the Plymouth County Court, last Wednesday, on behalf of the Tavistock Gas Company, for the enlargement of the operations of the Company so as to include the adjacent parish of Whitchurch. Mr. J. Shelly, Solicitor, who appeared for the Company, said the petition was submitted to the Court because it had jurisdiction. The petition was in accordance with a resolution of the Company passed in May. The parish of Whitchurch adjoining Tavistock, had become thickly populated, and its villa and other residents desired that it should be lighted with gas; but, under their present powers, the Company could not supply the place. There was no opposition; and his Honour made an order as prayed.

Claim Under the Workmen's Compensation Act.

At the Westminster County Court, on Monday last week, his Honour Judge Lumley Smith, Q.C., gave his award in the case of *Lloyd v. Sugg*, under the Workmen's Compensation Act. The applicant was George Lloyd, 67, a blacksmith, of North Kensington; and the respondents, Messrs. W. Sugg and Co. At the hearing, Mr. Duckworth appeared for the applicant; Mr. Spencer Bower for the respondents. Applicant's case was that on the 2nd of January he was holding a tool by means of a piece of wood, while in the employment of the respondents; and a boy who should have hit the tool with a hammer missed it, and struck the wood. His hand was "smashed" against the anvil, and some bones broken. Two days after the accident he was discharged. Evidence for the respondents was given to the effect that no bones were broken, and that Lloyd was dismissed for bad work done prior to January. The boy missed the tool because a spark flew into his eye. It was contended that a flying spark and a miss-hit with a hammer were of too common occurrence to be considered as accidents within the meaning of the Act, and, further, that Lloyd was suffering from gout, and not from any injury sustained while working for the respondents. His Honour's view at the hearing was that a master took the risk of employing a man with gout in his system, and if an injury were received which brought out the gout, the employer would be liable to pay the man compensation. In making his award, this view was confirmed by his Honour finding for the applicant, with costs. He awarded him 15s. a week, to date from a fortnight after the accident, and to continue till further notice.

Coventry Gas Profits.—The net surplus profit on the gas undertaking of the Coventry Corporation for the past twelve months is £4476. The Gas Committee will recommend the Council, at their meeting to-day, to pay over £4000 to the general district fund, and carry forward the remainder.

Sales of Shares.—At the Mart, Tokenhouse Yard, E.C., last Wednesday, Mr. Alfred Richards sold, by order of the Directors, 500 ordinary £10 "C" shares in the Westgate and Birchington Gas Company, ranking for a maximum dividend of 7 per cent. The last dividend on the Company's ordinary 10 per cent. capital was 7 per cent, which would be equivalent to a dividend of £4 9s. per cent. per annum on the shares offered. The majority of the shares fetched £11 each; a few being sold at an advance of 10s. on this figure. Some fully paid £10 shares in the Chigwell, Loughton, and Woodford Gas Company, earning 7 per cent., fetched £16 16s. each. A small parcel of £10 shares in the Hertford Gas Company, on which 7 per cent. per annum (tax free) has been paid, were sold for £16 10s. each. A few fully-paid £10 shares in the Woking Water and Gas Company, earning a 4 per cent. dividend, realized £10 apiece. On the same day, Messrs. Edwin Fox and Bousfield sold some ordinary stock of the Cromer Gas Company at £99 10s. per £100 of stock. On the same day, Mr. C. Stride, sold at Chichester 60 £10 shares (7 per cent.) in the Chichester Gas Company. They were put up in lots of five each; and six realized £16 15s. per share—the remaining six fetching £16 10s. per share. At another sale by auction on Wednesday, some "A" shares in the Wellingborough Gas Company changed hands at £67 each, "B" shares at £67 5s., and "C" shares at £18 15s.—all *ex*-div. On the same occasion, £400 "B" stock in the Kettering Gas Company found a purchaser at £730, and a few shares in the Irthlingborough Gas Company were disposed of at £18 15s. each. In accordance with the announcement which appeared in the "Journal," Mr. W. H. Swannell recently sold 700 new £5 shares in the Rickmansworth Gas Company (being a new issue of 7 per cent. capital) at an average price of £5 13s. 6d. each.

MISCELLANEOUS NEWS.

WELSBACH INCANDESCENT GAS-LIGHT COMPANY, LIMITED.

The First Ordinary General Meeting of this Company was held on Monday last week, at the Cannon Street Hotel—Sir HENRY BURDETT, K.C.B., in the chair.

The SECRETARY (Mr. W. R. Few) having read the notice convening the meeting, the report of the Directors, the principal portions of which were given in the "JOURNAL" for the 6th inst., was presented.

The CHAIRMAN, in moving the adoption of the report, remarked that it was so clear and detailed that it need not occupy the meeting very long. As the shareholders were aware, an initial mistake, due to the premature introduction of the new burners, had had an extraordinary effect upon the business of the year; for they created a demand in advance of the possibilities of supply. When the matter came to be looked into, it was found to be essential that before the new burners were brought into general use they should be thoroughly tested, so as to be as perfect as possible. It was a satisfaction to him to tell the shareholders that, although in consequence of this misunderstanding, and the impossibility of supplying the burners, their business diminished up to September, still ever since October it had largely increased month by month, and the earnings represented collectively a sum sufficient to pay a full dividend upon all the stocks of the Company. He was glad to say that the Kern burner was increasing in popularity, and they were doing a better business since the commencement of this year continuously than had ever been done in the history of the Company. This burner had helped them especially in connection with street lighting, which they had extended a great deal in London; and he was hopeful that by this time next year nearly all the streets of the Metropolis, or the vast majority of them, would be lighted in this way. The use of the burner had also extended in the provincial towns, with the remarkable result that those corporations, or some of them, who had electricity undertakings as well as gas-works, had decided that the Company's light was infinitely better for street-lighting purposes than electricity, and they had, therefore, adopted it in preference. This would afford some idea of the importance and value of the Kern burner. Passing on to deal with certain criticisms as to the position of the Company in relation to the expiration of the patents, he stated that the running out of the 1885 and 1886 patents did not in the slightest degree affect the prosperity of the Company. The shareholders must remember that when mantles were made in accordance with the 1885 and 1886 patents, the Company's business was so small, and the results were so disastrous, that the concern was on the verge of liquidation. It was saved by the 1893 patent. Some people spoke as if the expiration of the 1885 and 1886 patents would wreck the Company. But, as a matter of fact, its commercial success did not commence until they possessed the 1893 patent, which would not expire until 1907; and, until it did expire, the position of the Company as a commercial enterprise stood where it rested to-day. It was true that next year anyone might make mantles according to the 1885 or 1886 patents, which, from motives of policy, the Company had supported heretofore—holding the 1893 patent in reserve. The importance of this policy was fully illustrated by the fact that, in a recent decision given by the Supreme Court in Germany, the Judges declared that the patent rights would have been upheld if Dr. Auer had insisted upon the issue of the 1893 patent in that country. To show what importance the 1893 patent had, even in the minds of Judges in a foreign country, he might mention that the Judges in the High Court of Leipsic recently declared that it was a most deplorable mistake on the part of the German Patent Office not to have granted a patent to Dr. Auer for the 1893 invention. The Company, however, owned the British rights to this patent; and they were satisfied they could uphold it against all infringers. As to the legal position of the 1893 patent in England, they had the advice of the most eminent Counsel—Messrs. Moulton, Terrell, and Walter—as well as of Professor Dewar, Mr. Dugald Clerk, Mr. Swinburne, and Mr. Ballantyne, all of whom thoroughly understood the legal or technical questions involved. They were of opinion that the 1893 patent not only was a good and valid one, but that it would enable the Company to prevent others from manufacturing this special combination, which was the best article for incandescent lighting in the world. He purposely avoided saying anything as to the interpretation of the 1893 patent, because there was no doubt that when the other patents lapsed, the Courts would be called upon to put an interpretation upon it; and, after the fullest consideration, and with an absolutely accurate knowledge of the situation, the Directors awaited this consummation with perfect confidence. They had taken every precaution to safeguard the Company's patent interests and commercial position. Further than this they could not go; and with this they considered the shareholders should be fully satisfied. So much for the condition of the patents. The Company, however, were within measurable distance of the time, if it had not already commenced, when they would cease to talk of patents as being the basis of their prosperity. During the past year, they had extended and strengthened their organization. They had erected workshops for the production of their burners at Earlsfield, improved their system of mantle manufacture, and secured a trade mark—the word "Aur"—by which everybody could identify their goods. He attached as much value to this trade mark as he did to the patents. They had also reorganized their system of supply, and were developing means whereby they hoped to bring the excellence of incandescent gas lighting home to the knowledge of the majority of householders, and even to extend their system from the streets to the large workshops, which they had not hitherto been able to provide for, owing to the want of an appliance which would neutralize the effect of machinery upon the mantles and burners. This latter difficulty had been overcome by the introduction of the anti-vibrator, whereby incandescent gas lighting was rendered the cheapest and best form of artificial light for workshops and factories. It was infinitely better than electricity; for experience proved that arc lights were not suitable to workshops, owing to their tiring effect upon the eyes of the employees. The Welsbach system, therefore, occupied to-day a stronger position than it had ever before done in its history. But apart from the commercial strength of the Company, there was another side to their work, and that was its effect upon the gas industry as a whole. Mr. Marshall, the President of the Institution of Gas Engineers, pointed out, in the course of his address last month (*ante*, p. 1100), that in the history of the gas industry it had probably never been in a more flourishing condition, or based upon a sounder foundation, than it was to-day. Both on the Continent and in England the popularity and increased consumption of gas was little short of extraordinary. This great increase, originally due to the gas employed for cooking and domestic purposes, was now largely accounted for by its use as an illuminant. Such a result was entirely due to the work of Dr. Auer von Welsbach, the great Austrian scientist, who had practically "saved the illuminating gas industry from annihilation at the hand of its great rival, electricity." For a long time the leaders of the gas industry held aloof from the incandescent system. But during recent years, and especially since the incorporation of the Company, a marked change had taken place; and they had to acknowledge with pleasure the recognition of the value of the system by the leaders of the gas industry in this country. With their co-operation, great strides had been made during the past few months, especially in the direction of street lighting. The Directors very cordially welcomed this co-operation. One of the chief reasons which induced him to undertake the responsible duties of the chairmanship of the Company was that, after most careful inquiry and full consideration, he came to the conclusion that there was a very large business to be done with the aid of the great Municipalities and gas-supplying Corporations in extending the Welsbach system, and so adding greatly to the happiness and the comfort, not only of the citizens of London and of every great centre of population, but of the humbler dwellers in smaller communities possessing a gas supply. He had given a great deal of attention to this point; and he was pleased to state that he hoped before long it might be possible to secure the active co-operation of a few of the more representative leaders of the gas industry in this country, who recognized the importance of the system, and who wished with its aid to secure adequate protection and the means whereby gas as an illuminant would be able to hold its own against all competitors. Formerly it was feared that Dr. Auer von Welsbach's invention, so far from aiding, must, if it became widely popular, largely diminish the profits of gas undertakings, by reducing the quantity of gas consumed. Experience had exploded this fallacy; and a comparison of the Board of Trade Returns as to gas undertakings for the year before the Welsbach system was introduced (1882) and for the last years for which the returns were available (1896 and 1897), proved that an enterprise like the Company's, by which a better light at a cheaper rate with a small consumption of gas was secured, was in reality the best friend of the gas industry. Thus the quantity of gas sold by authorized gas undertakings, apart from lighting authorities, in 1896 compared with 1882, was 60 per cent. more; while the number of consumers had increased 36 per cent., and of public lamps 27 per cent. It further appeared that the capital of gas companies before the Welsbach invention was only £28,000,000; while the actual capital invested at the end of 1896 was no less than £41,000,000. Such figures as these should prove very encouraging, not only to the gas companies, but to everyone interested in the Welsbach system. Encouraging as they were, however, he had no doubt that, if it should be possible, as he believed it would be, to bring about intimate relations and co-operation between the Company and the principal representatives of the gas industry throughout the country, there could be no question that a few years hence the results would be even more satisfactory than those which these figures indicated. He now came to one of the most important parts of his speech; for he had to tell the shareholders something about a new system of electric lighting. When he last had the pleasure of meeting them, he made the important announcement that the name of the Austrian Company would be altered to "The Austrian Incandescent Gas Lighting and Electric Company," in order to allow of provision being made for the establishment of one Company for both incandescent gas and electric lighting. Since that meeting, Dr. Auer had continuously worked at his new invention; and he had at length succeeded in bringing his new lamp from the laboratory stage to a point where it could be produced as a commercial commodity. In order to satisfy the requirements of commerce, a further series of researches were necessary, which Dr. Auer was pursuing; and as he proceeded he was making many new and important discoveries for which patents were being procured. During the last twelve months, important developments had occurred. The Directors had been employing expert assistance; and, by inquiring in various countries, they had ascertained that the metal osmium could be obtained in sufficient quantities for Dr. Auer's requirements. He had further brought his invention to the point when it would yield one candle per watt, whereas from three to four watts were required to produce one candle under the existing methods of incandescent electric lighting. It was stated in the report that the 500,000 fl. (say, £42,500) required in the first instance for the electrical undertaking had been set aside out of the property of the "A" undertaking, and stood to the credit of the reserve funds of the Austrian Company, although a portion only of this sum had been required. He might add that this money had been provided without trenching on the profits of the Austrian Company. These were material points; and he attached even greater importance to the circumstance that Dr. Auer's experience and knowledge in the past afforded an absolute guarantee that when this electric lamp left his hands it would be so perfect as to meet every requirement of electric lighting. He (the Chairman) thought it well to make this point clear, because he had heard it asserted that it would fail in this direction or in the other; and he knew from what took place in Berlin during his recent visit, when he had the pleasure of meeting Dr. Auer there, that all such statements had no better foundation than a possible desire to discredit what seemed likely to prove one of the greatest and most valuable inventions the world had ever seen. There could be no doubt that the Welsbach shareholders possessed a most valuable property at a small cost, under the contract which he explained to them at the meeting in March, whereby they had secured participation in this new invention to the extent of three-sevenths of the property of the electrical undertaking of the Austrian Company, in addition to three-sevenths of the whole of their earnings. When it was realized that this important result had been secured by a loan at 4 per cent., which was not to exceed in the whole £92,500, and which was repayable out of the earnings of the electrical undertaking before any dividend could be paid to the "B" shareholders, he felt confident that

the proprietors would appreciate very highly the immense possibilities likely to accrue to the Welsbach shareholders under this contract in the course of the next few years. It was not unnatural that they should be impatient to hear when the new electric lamp would be exhibited and be purchasable. The latest information he had received from Vienna was that Dr. Auer's experiments would be completed within the next two or three months, and that a similar time would be required for the industrial development of the invention. So that there was no doubt that at the end of this year or the beginning of next the Company would be in a position to appear before the public with a marketable article. Meanwhile, it was the intention of Dr. Auer to disclose to the world the full extent of his discoveries before a learned society in October next. All who had any inner knowledge were originally astonished at the statements of Dr. Auer that he would be able to produce such favourable results with lighting by electricity as one watt per candle for an electric lamp. There was, however, no question of doubt that he had already proved his contention that the lamp as made did really give this result; that the further developments to bring the lamp into a completed state for commercial use were proceeding definitely step by step; and that the next six months would prove to the world at large that Dr. Auer had made an invention for electric lighting just as important as that which he made in 1885 and 1893 for gas lighting. Proceeding to deal with the question of the Company's reserves, the Chairman remarked that the Auditors had certified the accounts "subject to goodwill being maintained at cost, and to depreciation of the patents by effluxion of time." Some critics had spoken as if the introduction of these words in the Auditors' certificate raised a novel point; but this was not so, since every industrial enterprise which depended upon patents must be subject to like contingencies. They had set aside £25,000 to the reserve fund, and had only paid a dividend on the deferred shares for the broken period between the date of incorporation and the end of the financial year, whereby the payment of future dividends on the deferred shares would be simplified. They had put aside the sum named to enable them to fully develop the business in this country, with a view of increasing materially the profits resulting from the English Company during the current year. In conclusion, having regard to the last fifteen months—the most difficult period, in his judgment, which the Company would probably have to face, certainly for some time to come—he expressed the hope that the shareholders would support the Board and himself by giving them their confidence, and by exercising, if necessary, though he did not anticipate the necessity was likely to arise, some little patience.

Mr. Julius Moeller seconded the motion; and, after a few remarks, it was carried unanimously.

The retiring Directors (Mr. A. J. Bethell and Mr. J. T. Woolrych Perowne) having been re-elected,

The Chairman moved the declaration of a dividend on the preference stock of 5 per cent. for the year; on the ordinary stock, of 7 per cent. for the year; and on the deferred shares, of 7 per cent. to March 31, 1898.

Mr. Lancaster seconded the motion, and it was carried.

Messrs. Deloitte, Dever, Griffiths, and Co. were then re-elected Auditors of the Company for the ensuing year.

The Chairman, in acknowledging the vote of thanks accorded to him, said he had omitted to correct a mistake in the report. It stated that "the exclusive licence has been obtained from the Matchless Gas Lighting Syndicate for an excellent self-lighting apparatus on a royalty basis, without any capital expenditure." The sentence should have read: "The exclusive licence has been obtained for incandescent lighting from the Matchless Gas Lighting Syndicate," &c.

The proceedings then terminated.

MALTA AND MEDITERRANEAN GAS COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held last Tuesday, at the London Offices, No. 60, Gracechurch Street, E.C.—Mr. J. Birch Paddon in the chair.

The Secretary (Mr. A. W. Cooper) read the notice convening the meeting; and the report and accounts were then presented.

The Chairman, addressing the shareholders, said a comparison made between the state of the Company's affairs this time last year and now would reveal no very important differences; and it might be thought they were not very progressive. But if the comparison were extended over the past history of the Company, the shareholders would see there were no grounds for such an apprehension as that. Indeed, they would find abundant evidence of very substantial progress. It was nearly a quarter of a century since he entered upon the duties of the chair; and he had a clear recollection of the position of their affairs at that time. About twenty years ago, they had emerged from some difficulties; and they then thought they were very well off indeed. But if they compared that time with the present, and excluded, for the purposes of comparison, all influence of the Corfu transfer (which would make the differences he was about to mention appear even greater than they did), they would find that twenty years ago the capital was considerably larger than at present. The amount of gas sold now was very nearly double what they sold at that time, reckoning for the loss of the Corfu business; and the price charged was as nearly as possible half of what it was then. Notwithstanding all this, their profits were larger to-day, and the assets were more valuable. Moreover they had borne the full weight of a serious inroad upon their business from the establishment of electric lighting by the Government in Malta; and they had done this without decreasing the customary dividends. Few gas companies had had more to contend with than they had; and few had come out better. With regard to the incidents of the year, at Malta three things had adversely affected the sale of gas. The first was the electric light. Of this there was not a great deal to be said. It had, he believed, realized the worst predictions of its opponents at the time it started; and he was not aware that a single advantage had been obtained from its use. But it was in the irresponsible hands of the Local Government, with plenty of money, and who were therefore superior to all considerations of profit and loss—details which would not weigh with them in the slightest degree. Therefore they might be expected to go on; but the difference between the cost of electric lighting and that of gas was so great that the Directors no longer feared much. They believed the Company had really sustained all the ill that could come to them from this competition. The next thing which had militated against the Company was the fact that the P. &. O. Steamship Company had taken off nearly all their big ships from Malta; and only small ones called there at the present time. This represented a considerable diminution in the quantity of gas consumed. The other matter which he had in mind was that of incandescent gas lighting. Incandescent burners, it appeared, only required about half the gas consumed in the burners they superseded. This was evidently a drawback to the Company. But, on the other hand, many of these burners occupied the place of the electric light, which was an indirect gain to them; and he was not at the moment prepared to say which way the balance went—whether they had sustained much loss or gained much by it. This would be known in course of time. It was certain they could not stay the use of these burners; neither would they if they could. It was a movement that would go on either with or without them. Meantime, it had the beneficial effect for those persons who used them of a substantial reduction in the price of gas; and in this way the Company had an indirect gain. Notwithstanding all these drawbacks, the Company had held their own; and the amount of gas sold during the year was more than that of the previous year. The requirements of the naval authorities had increased; and the Directors believed they would increase still further. There had also been a good many stoves brought into operation, which had helped them very much. At Sliema they had last year an increase in the consumption of no less than 32 per cent., and in the preceding year 21 per cent. Thus they had an increase upon increase; and they believed things were going on very well there. Having referred to the devotion to the Company's interests of the Manager (Mr. Starkey), he mentioned that the money owing to them by the Municipality of Corfu for gas supplied had not yet been paid. The collapse of the Greek interests was so complete, and everything was so shattered there, that time was absolutely necessary for the town to recuperate and regain its position. A great deal was being done in this way; but the country was in a state in which the decisions of its legal tribunals could not be enforced, and there was therefore nothing to do but wait. But he might say that at no previous time did they feel so confident that this amount would be paid as they did now. An additional ground for confidence was the fact that the matter had the attention of the Foreign Office, from whom the Company had received such signal advantages in times gone by. With regard to the Sicilian stations, they were perhaps in rather a better position than this time last year; for both showed an increase in the sale of gas. The debt at Marsala was still unpaid; but it had, he thought he might say, been made quite secure. Although, perhaps, the Board might have put a little more pressure on in regard to this matter, it was hardly expedient to do so; and he supposed it would not be very long before it was paid. As to Trapani, things were more promising; it was a better place than Marsala. In both towns, however, the dark shadow of taxation hung over them, and prevented anything like satisfactory progress. This taxation was a growing thing. Not only did they get new taxes, but increased assessments; and one could hardly tell where it would end. Of course, the direct tax upon gas was borne by the consumers; the weight did not fall upon the Company. But it must be evident to everybody that the taxes must act as a great deterrent to the use of gas. All the works were in good order, with some slight exceptions. They had been recently inspected by one of the members of the Board—Mr. Basil Makins, to whom they were indebted for a very exhaustive and valuable report. The exceptions to which he referred were two gasholders, which would require repairing during the summer; and both would be a revenue charge. Some new mains would also be wanted; and they hoped to be also able to charge these to revenue. Turning to the balance-sheet, it would be seen that the chief difference between this and the previous one was that they owed £1547 more; but they had £2111 more to pay it with. The increase was mainly owing to some purchases of coal which they thought it desirable to make, and which certainly answered their purposes. The stock of coal was considerably larger—£1381—than last year; so that the greater indebtedness was pretty well accounted for. The general revenue account showed the reductions which had been made in the debentures and in the interest thereon. The reserve fund simply recorded the addition to it of £500 from last year's profits. The profit and loss account was somewhat more interesting. It would be seen there that coal had cost £855 more, although 241 tons less had been used; and this increase worked out to about 2s. 1d. per ton. With regard to this difference, he might point out that it looked larger, because the cost of coal in the preceding year was abnormally low compared with the price paid by other companies. Wages and salaries were slightly less, notwithstanding the fact that they had made more gas. The charges for maintenance were higher. They would have been much lower than they were; but last year they had a severe hail storm at Malta, which damaged the roofs on the works considerably, and they had had to spend nearly £200 in putting them right. They had also been spending a good bit of money in the endeavour to reduce the unaccounted-for gas. The taxes and law charges were £295 more; and the whole of this had been incurred in connection with the Sicilian stations. The smallness of the amount of bad debts was evidence of what was called "due care and management." They were very low indeed—£34; and this upon an account of £27,000 was certainly not very high. The entire revenue expenditure was £915 more. But, as he had mentioned, coal had cost an additional £855, and taxes £295; so that, had it not been for these exceptional charges, the revenue expenditure would have been much less than in the preceding year. There had been an improvement in the working results. At Trapani, the gas made and sold was better than at any of the other stations; and this was quite a "feather in the cap" of the Manager there (Mr. Marino). Altogether the quantity of coal used was 9573 tons; and from this they had made, in round figures, 100 million cubic feet of gas, and sold 87 millions—the difference being 13·38 per cent. During the year efforts had been made to decrease the unaccounted-for gas, and not without some good results, which would be seen more conspicuously in the current year than in the past. They would continue those efforts notwithstanding the expense; but he must say that the correction of the leakage at Malta was a difficult task, and would be a matter of time. The gas-rental was about £376 more; and in face of the drawbacks they had experienced this was encouraging. Respecting the residual products, although they had used 214 tons less coal, and had consequently produced less residuals, they had an increase of £285 under this

head, which was very satisfactory. The item of fittings and meters, which was very high in 1897-8, again showed a small increase. Then there was the dividend upon investment on account of the Corfu property. This was a diminishing item, because they had taken a part of it to redeem some debentures. The profit earned was £9381; and after paying the dividend on the preference and ordinary capital, there would remain £815, which was very similar to the sum brought forward last year. The Directors then managed to put £500 to the reserve fund; and they hoped to do the same this year. He concluded by moving the adoption of the report and accounts.

Colonel J. Le Geyt Daniell seconded the motion.

Mr. A. M. Paddon said there were very few companies who had had to sustain the rigour of competition with the electric light more than this Company had; and the shareholders could congratulate the Board upon the judgment and wisdom with which they had dealt with it. Referring to the use of the Welsbach light in counteracting the electric light, he held that it would fight the electric light in a more successful degree than any other expedient at the command of a gas undertaking. It had been pointed out by the Chairman that the ultimate advantage of the employment of the Welsbach light would rest with the Company; but very few people seemed to appreciate what was really the initial disadvantage. It was not that the burners used less gas (he did not think the difference between the individual burners was so great as people imagined); but it was this, that one incandescent burner frequently displaced three or four ordinary ones. In spite of this, however, the consumption of gas was greater this year than last. He believed the Company had about 2000 of these burners in use.

The motion was unanimously carried.

On the proposition of the Chairman, seconded by Mr. Stephenson R. Clarke, a dividend was declared at the rate of 7 per cent. per annum on the first preference shares, 7½ per cent. on the second preference shares, and 6 per cent. on the ordinary shares, less the payments already made on account.

The Chairman next proposed, and Mr. Joseph Cash seconded, the re-election of Mr. Basil T. Makins as a Director; and this was agreed to.

The Auditors (Mr. R. Hesketh Jones and Mr. T. Guyatt) were also re-appointed.

The usual complimentary votes to the Chairman and Directors and officers concluded the proceedings.

THE PRODUCTIVE UNDERTAKINGS OF BRADFORD.

Alderman Ratcliffe, the Chairman of the Finance Committee of the Bradford Corporation, made his annual statement at the meeting of the Council last Tuesday. Referring to the value of the municipal undertakings, he said that last year the total receipts on water-works account for all purposes, including the sum allocated from gas profits, were £141,335, and the total payments £141,161—leaving a net balance of £173. This was the result after paying all interest on the money which had been expended, and was being expended, on the Nidd Valley works, and which interest amounted to £20,888 per annum. The fact that they were carrying such a weight as this, and yet doing so well, reflected great credit upon the Water Engineer and the Committee generally. Next year the Committee expected to receive, without gas profits, £138,590; and they calculated that their expenditure would be £138,380. He had an interesting statement regarding the capital invested in the water-works up to March 31 this year. It was as follows: Gouthwaite reservoir £201,463, Gouthwaite lodge £2937, Angram reservoir £1704, Lodge and High Woodale reservoirs £19,678, Nidd aqueduct £401,278, Chellow Heights reservoir £69,230—total of Nidd works, £696,292. Upon the old works the expenditure was £2,349,172—making a total for all works of £3,045,464. The interest on the Nidd outlay, which was still unproductive, was, as he had said, £20,888. If, therefore, the water-works had not been loaded with this dead weight, they would have shown a net profit, after paying interest and sinking fund on the old works, of £21,000, less £3000 received from gas profits, or about £18,000 net profit. The ordinary income, excluding gas profits and arrears of rate-in-aid, was £138,300, and the working expenses, excluding interest and sinking fund, and treating the concern as one would treat an ordinary limited liability company working with its own capital, or with borrowed money, showed a trade profit of £113,488, representing £4 16s. 7½d. per cent. upon the capital invested in the old works, or a trade profit capitalized on a 3 per cent. basis of £3,782,933. This would pay off the whole of the debt at present owing on water-works, and leave a grand surplus of £1,125,186. He held that they were perfectly justified in claiming that the equity of the ratepayers of Bradford in these water-works, after paying off all liabilities, was the amount named. As to the gas undertaking. On March 31 last year, before the Council were asked to vote a sum in aid of rates, there were undistributed gas profits amounting to £48,416. During the past year, the sum of £17,950—made up of £7700 for city rate, £7250 for district rate, and £3000 for water-works revenue—was appropriated, leaving £30,466 in unappropriated profits. To this sum must be added the net profit for the year ending March 31—£21,500—making a total of £51,966 in hand at the commencement of the current financial year. The Council were now asked to vote £14,950 of this sum, which would leave £37,016 available on March 31 of next year, without reckoning the profits during the current year. It might be interesting to state that the profits made by the gas-works from their first being taken over by the Corporation—in addition to which the streets had been lit free of charge for gas—amounted to £457,717; and out of this there had been appropriated for the relief of rates no less than £405,750. Then the Electricity Department promised to be equally successful. The net profits upon the electricity works since their establishment amounted to £23,606; and there had been written off for depreciation of plant and machinery £10,708—leaving unappropriated profits on March 31 last to the amount of £12,898.

We have received the first part of the new volume of the "Birmingham Magazine of Arts and Industries," which contains an interesting illustrated article giving a sketch of the origin and growth of the firm of Messrs. W. Parkinson and Co. (London and Birmingham), and describing the nature and extent of the work on which they are engaged.

SOUTHPORT CORPORATION GAS SUPPLY.

The Gas Engineer's Report.

In the "Journal" last week, we briefly noticed the annual report of the Gas Engineer of the Southport Corporation (Mr. John Booth). It is, as usual, addressed to the Gas Committee; and it opens with the satisfactory statement that in the financial year ending the 31st of March there was a large increase in the quantity of gas made and sold—a "record" increase, in point of fact—better returns were obtained for residuals, and there was decreased expenditure on revenue account for the maintenance of works and plant and the renewal of mains. This diminution was foretold by Mr. Booth in his report last year; and as it has been coupled with economy in the purchase of materials and a reduction in wages, augmented profit has resulted. But two other factors have had an important bearing upon the successful results of the past year—viz., the adoption of an improved method of working the oil-gas retorts, and higher results from those producing coal gas, owing to better heats being obtained from the retort-furnace introduced by Mr. Booth some years since. He acknowledges that its action was for some time not so successful as he anticipated; but the improvements effected have resulted in the production of a furnace which combines simplicity, heating power, and economy in fuel consumption and cost of construction, and which Mr. Booth considers will compare favourably with any he knows. Turning to the statistical portion of the report, the carbonizing figures show a decrease to the extent of 1877 tons of cannel and an increase of 531 tons of coal employed in the past year; the total quantity of solid raw material weighing 33,827 tons. Of oil, 1374 tons were used, or 83 tons less than before; and also 453 tons of coke. The total quantity of gas made was 400,043,000 cubic feet. The increase over the previous year was 31,349,000 cubic feet, or 8·50 per cent.; this being the largest increase in quantity made in any previous year (except 1895, with which no comparison is made owing to the coal strike of the previous year). While the additional make of gas was so large, there was a net decrease of 1202 tons in the carbonizing materials used. The minimum and maximum daily makes of gas during the year were respectively 643,000 and 1,680,000 cubic feet. The total quantity of gas sold was 388,844,600 cubic feet; the increase over the previous year being 29,929,900 cubic feet, or 8·33 per cent., or greater than in any previous year. The minimum and maximum deliveries of gas during 24 hours were 521,000 and 1,803,000 cubic feet respectively. The gas sold is accounted for as follows: Lighting, 278,214,600 cubic feet; cooking, &c., 78,315,600 cubic feet; public lamps, 32,412,700 cubic feet; private lamps, 108,800 cubic feet. Compared with the year 1897-8, these figures show the following increases: Lighting, 7,770,300 cubic feet; cooking, &c., 20,895,400 cubic feet; public lamps, 1,119,300 cubic feet. Prepayment meters were introduced to non-consumers of gas in April, 1898; and during the year under review there were 501 of these meters fixed—the total quantity of gas consumed by them being 2,319,400 cubic feet, and the revenue £401 17s. 8d., collected in 96,452 pennies, weighing about 18 cwt. The average consumption and revenue of each meter were 4629 cubic feet and 16s. respectively. The revenue from the sale of gas by meter was £53,217, or £3969 more than in the preceding year; from public lighting, &c., £3890, or £136 more; from the sale of residual products, £9814, or £800 more. The expenditure on coal and oil was £19,629, or £1415 less than in 1897-8; on wear and tear, £4750, or £1451 less; and on salaries and wages, &c. (distribution), £2254, or £2221 less. The gross profit amounted to £23,978, and the net profit to £15,147; being increases of £8824 and £8431 respectively. The net profit has been appropriated thus: In aid of the rates, £7000; last year's deficiency, £4537; renewals fund account, £1140; reserve fund, £1000; deficit on cookers account, £970; workmen's accident fund, £500. The £4537 mentioned above is the balance of anticipated profits for 1897-8, which the Finance Committee had fixed at £11,053; the actual profit being (less £200 placed to the reserve fund) £6516. For the future, the Gas Committee have agreed to vote a definite amount annually in aid of the rates, to build up a reserve fund to the amount of £5000, and to form a renewal fund of £10,000. The object of these two funds is to make up any deficiency occurring in the amount voted in aid of rates, and to pay for extraordinary renewals of plant, instead of meeting this expenditure out of the current year's revenue, as in the past. Mr. Booth regards this as a satisfactory arrangement, as by it the jumping up and down of the year's profits will be avoided in the future. The reserve fund now amounts to £3116. There was only a small expenditure on capital account last year—£5318; £2539 being for meters and £2517 for cookers. The total expenditure on capital account to the end of the year amounted to £238,062. Of the £10,000 borrowed on gas-cookers account, a sum of £9091 has been expended; and to meet the increasing demand in this department, application has been made to the Local Government Board for an additional £5000, and it has been granted. The number of cookers in use at the end of the year was 1550, compared with 1162 at the close of the previous twelve months; the number of meters being 13,769—an increase of 1379. Mr. Booth concludes by stating that the general condition of the works and plant is satisfactory.

Appended to the report are the accounts as certified by the Borough Accountant (Mr. G. Lloyd). He shows therein that the manufacture of gas cost 1s. 7·86d. per 1000 cubic feet sold; distribution, 2·27d.; and management, 1·10d.—the total expenditure working out to 2s. 1·18d., against 2s. 6·01d. for the year 1897-8. The receipts for residuals were equal to 6·05d., and meter-rentals, &c., to 1·21d.; bringing the above amount down to 1s. 5·92d. Adding the interest and sinking-fund payments, 5·44d., makes 1s. 11·36d., against 2s. 4·25d. in the preceding year. The capital employed in the gas undertaking at the close of the financial year (£238,062) was at the rate of £6 13s. 6d. per ton, and 12s. 3d. per 1000 cubic feet of gas sold. The estimated quantities of residuals produced were: Coke, 22,091 tons; breeze, 804 tons; tar, 2142 tons; ammoniacal liquor, 982,980 gallons; sulphate of ammonia, 372 tons.

The report came before the Town Council last Tuesday, and gave rise to an important discussion. Dr. Weaver suggested that the profits of the gas undertaking should, in a greater measure than at present, go to the gas consumer. The price of coal might go up; but as they had cleared off a deficit of £4500 last year, he thought they might this year reduce the price by 3d. per 1000 cubic feet, which would lower their profits by £3500. Alderman Unwin said the reduction would cost £4000; but at

present they were simply anticipating their profits. Mr. Hulme said he remembered a previous occasion when they reduced the charge for gas, and the result was anything but satisfactory. He hoped they would not interfere with the price until they could do so without loss to the ratepayers. Mr. Dimond moved that the price should be reduced 1d. per 1000 cubic feet for lighting purposes only. He thought they could go as far as that. Alderman Fisher said he quite agreed that the people who made the profit should have a share of it, and he moved that it be an instruction to the Committee to take into consideration the desirability of reducing the cost of gas for lighting. This was eventually agreed to.

STAFFORD CORPORATION GAS AND ELECTRICITY DEPARTMENTS.

Proposed Introduction of Profit-Sharing.

At the Meeting of the Stafford Town Council last Tuesday, the presentation of the report of the Gas and Electricity Departments brought out a fact of peculiar significance in connection with the undertaking. The Committee had passed a resolution expressing the opinion that the time had arrived when some principle of profit-sharing in the shape of a bonus to the employees of the departments might with advantage be introduced, and a Sub-Committee had been appointed to consider the subject. The idea was discussed some years ago, but difficulties came in the way and a further attempt would now be made to bring the scheme to a successful issue. The Committee were unanimously of opinion that while the departments were prosperous in itself they ought to let the employees have some interest in increasing that prosperity and reaping some benefit by the increased energy which it was hoped they would instil into their work. We gave in the "JOURNAL" for the 30th ult. the principal items in the accounts of the Gas Department, as furnished by the analysis prepared by Mr. J. Ferguson Bell, the Gas and Electrical Engineer; and when they came before the Council at the previous meeting, the Chairman of the Committee (Alderman Wright) said he believed the net profits were more than they had ever been in any single year since the works had been in the hands of the Corporation. Referring last Tuesday to the progress made since that meeting, he said the consumption of gas was steadily rising, and the record for the month showed an increase of something like 5 per cent. upon the corresponding period of last year. As the outcome of the gas-stove exhibition held in the town six weeks ago, the Committee had orders in hand for the supply of 60 gas cooking-stoves and 70 prepayment meters. With regard to the Electricity Department, there was an increase of about 30 per cent. in revenue compared with the corresponding month of 1898. The statement of accounts for the year ending March 25 last showed a total revenue of £1443, or an increase of £150; and a total expenditure of £791, including generation, distribution, rates and taxes, management, bad debts, &c.—an increase of £52. Consequently, for the first time, they were able not only to pay their expenses and interest on the loan, but to make their first repayment on capital account. They had borrowed a total sum of £19,619 on capital account; and they had repaid nearly £2000, which was very satisfactory. Mr. Westhead pointed out that the revenue from the Electricity Department was equivalent to a dividend of £3 2s. 6d. per cent. on the capital, with an addition of £72 to reserve fund. The report was adopted. The profit-sharing scheme will now be considered by the Sub-Committee; and there is little doubt that, in a short time, Mr. Bell will see the realization of a project which he has had in his mind for some two years, and the Stafford Corporation will occupy the unique position of being the first public body to introduce profit-sharing.

HINCKLEY GAS SUPPLY.

A Good Year.

At the last Meeting of the Hinckley District Council, the Gas Manager (Mr. F. Lee) presented his statement of the accounts of the Gas Department, with his report thereon, for the year ended March 31. The total revenue amounted to £9099; and the cost of gas (exclusive of interest, &c.) was £5691—leaving a gross profit of £3408. After deducting interest, instalment to sinking fund, and balance of cost of alterations to the Manager's house, there was a net profit of £1200 14s. During the year the expenditure was considerably increased by higher wages and dearer coal; and there was also a decrease in the receipts for tar. On the other hand, the returns for coke and the profit on sulphate of ammonia were more. The quantity of coal and cannel carbonized was 4937 tons; the bulk of gas manufactured being 50,286,000 cubic feet, of which 45,239,100 cubic feet were accounted for—leaving 5,046,900 cubic feet, or 10·03 per cent, as loss. The number of ordinary meters in use was 1176, compared with 1154 in 1897-8; being an increase of 22. The number of prepayment meters was 26, against 14; being an increase of 12. The number of gas-stoves on hire was 118—an increase of 3 on the year. The Chairman (Mr. J. Abbott) said he thought the Council might congratulate the Manager upon his very successful year's working. In spite of the adverse circumstances with which he had had to contend, he had made a handsome profit. Interest had had to be paid on the new loan of £9500; and the new works had not been much advanced, and had been no benefit up to the present. Then there had been a general rise of wages allowed; and the cost of coal had increased. Otherwise, on the old lines, there would probably have been a much larger profit than they had, which was slightly more than £1200. He did not remember the gas-works having done so well. There was every credit due to the Manager for the energy and attention he had put into his work; and he (the Chairman) was pleased to move a vote of thanks to him for his services. He did not profess to be a financier, but there was one thing which gave him a great amount of satisfaction. Whereas in 1898 they were some hundreds of pounds to the bad at the bank, and could not meet their liabilities, they were at the end of March last, some £400 to the good, after receiving all owing to them and paying all they owed. This showed that they were going the right road. The vote of thanks to the Manager could not spur him on to greater diligence; but he (the Chairman) thought it would be a mark of the respect and confidence of the Council. He hoped it would be long before Mr. Lee left Hinckley. Mr. Kinton said the vote of thanks to the Manager applied to the manner in which the work of the Gas Department had been carried out generally. He thought that, under the careful and able management of Mr. Lee, there was a bright prospect for the gas-works; and before long, although they were so heavily burdened, they would be a source of help to the town. Mr. Lee thanked the members for their expression of confidence. He said he came to Hinckley to do his duty; and he would continue to do it.

EAST DEREHAM GAS-WORKS.

The Dismissal of the Manager.

From the report of the proceedings of the last Monthly Meeting of the East Dereham District Council, it appears that the severance of the connection of the Gas Manager (Mr. A. Drage) with the gas-works was a compulsory and not a voluntary one. Mr. Merry introduced the matter by inquiring if the Chairman of the Gas Committee was going to give any explanation as to why the Manager was discharged. Mr. Green said the answer was that Mr. Drage was dismissed at a meeting of the whole Board; and he did not feel it was the duty of the Chairman to make any report. The Clerk had been instructed to make further inquiries. Mr. Merry thought it was due to the ratepayers to know why the Manager was, as stated in the minutes, peremptorily dismissed. He wanted to make it clear to the town that he was not discharged because of any clerical errors made, or because of any slight discrepancy that occurred in his management of the works, but because of defalcations that had been found out in regard to his transactions in the accounts of the gas-works. In the Council-room he admitted the shortcomings of which he was guilty; and he afterwards expressed his acknowledgment to the Council for what he considered the lenient manner in which they had treated him. Mr. Vores read several statements referring to the alleged defalcations. In one case the Manager had received £90, £63 17s. 6d. of which he paid into the bank. In another case he received £40, and paid in £19 8s.; and in the third case £34 4s. 2d., and paid in £32 18s. 4d. Since the last meeting he had made further inquiries, and with the exception of a few gallons of tar, had not found any more actual defalcations. Mr. Cranmer said what Mr. Merry wanted was an answer to the question as to why they hastily dismissed Mr. Drage at the last meeting. The fact was they found that the Manager had kept some money belonging to the Council, which he acknowledged having done; and they thought it was high time he should be discharged. As the Council appeared anxious to hear his statement, he thought it would perhaps be better that he should make it. Mr. Cranmer then read a lengthy report on the working of the undertaking, particularly during 1897-8 and 1898-9. In 1897-8 the coal consumed was 1057 tons, which should produce 10,701,400 cubic feet of gas, 1,046,500 of which was unaccounted for. The produce in value, at the rate of 47s. 4d. per ton, was £2501, of which £301 was unaccounted for. For the first five years of the new gas-works—that was, from 1890 to 1894—the coal consumed averaged about 1020 tons; and the receipts for residuals about £350 per annum. In 1895, the receipts for residuals fell to £265, or about £85 below the average. In 1896-7, the receipts rose to £296, but were still £54 below the average of the first five years of the new works. In 1897-8, although 37 tons of coal were used above the average, the receipts for residuals fell to the extraordinarily low sum of £210, or £132 below the average. The minimum yield of coke should be 13 cwt. per ton, which would make 687 tons, of which 115 tons were unaccounted for. In 1898-9, 1142 tons of coal were consumed, which should yield 11,420,000 cubic feet of gas, of which 1,118,370 was unaccounted for. The value of the yield of gas and residuals was £2703, of which £341 was unaccounted for. About 114 tons of coke were also unaccounted for. The next part of the report referred to the Manager's negligence in small matters. It was also stated that his recent reports had been tendered monthly to the Council, he well knowing their inaccuracy. For instance, the report on April 1 stated that there was 47 tons 14 cwt. 56 lbs. of coke in stock, when on that day there was not so much in stock as the odd hundredweights. Again, the monthly report for May 1 stated that 53 tons 11 cwt. 55 lbs. were in stock, while on that day also not even the odd hundredweights were in stock. Mr. Cranmer thought the Council had not looked after Drage as they ought to have done. He was not in favour of further proceedings. It was decided that the matter should be again considered at a special meeting of the whole Council.

GAS v. ELECTRICITY FOR STREET LIGHTING AT WORCESTER.

In the "JOURNAL" for the 30th ult. (p. 1443), we reported the discussion at a meeting of the Watch Committee of the Worcester Town Council on the subject of the lighting of Friar Street—the question, it may be remembered, turning upon the employment of gas or electricity. The matter was under consideration again at the meeting of the Committee last Friday, when Mr. Jeff proposed that five incandescent gas-lamps, of 200-candle power each, be erected, at a cost of £5 apiece, instead of the three electric lights recently put up, the annual cost of which would be £7 each. He said that he and others had inspected the lighting of the street, and considered that at present it was insufficient. Mr. Charge seconded the proposition. Alderman Millington referred to the excellent manner in which another part of the city was lighted by gas; and suggested that if the same idea were adopted in Friar Street it would be the best-lighted street in the city. Mr. Radford asked the Town Clerk if shareholders in the Gas Company were justified in voting upon that matter. The Town Clerk replied that he should certainly think no shareholder would vote. Alderman Caldicott proposed, as an amendment, that the three electric lamps be retained. He contended that the street was magnificently lighted. Mr. Radford seconded the amendment. He said there had been more complaints made in that room about the lighting of Friar Street than there had in the neighbourhood of the street itself. Further remarks, in which the gas and electric lights were compared, to the disadvantage of the latter,

having been made, the Mayor (Mr. J. A. Steward) said if anyone thought he would not vote there or in the Council because he happened to be a shareholder in the Gas Company, it would be most uncharitable. He came there to do his duty; and he should vote for what he thought best and right for the general body of the citizens. The Company were independent of this contract; and he was sure they would be able to pay their dividends without it. If they offered a better light for less money, whether he was a shareholder or not, he should consider it his duty to vote for the acceptance of their tender. He felt sure that no member of the Committee advocated gas through any dishonest motive. His Worship expressed himself ashamed of the electric light in Friar Street, and again alleged that the lamps had to be pointed out to him before he could distinguish the presence of the light. It was, he said, a "miserable thing"—like a "rushlight;" and many of the residents had told him that they would like to have the gas-lamps replaced. They were ratepayers, and as such were entitled to their consideration. The amendment was then put, and carried by four votes to three.

ELECTRIC LIGHTING NOTES.

At a meeting of the Swansea Electric Lighting Committee last Wednesday, a communication was read from the Local Government Board authorizing the Corporation to raise a loan of £52,000 for the purpose of lighting the town by electricity.

The purchase of the Sheffield Electric Light and Power Company by the Sheffield Corporation was completed yesterday week, when the shareholders in the Company received a final distribution of assets. The purchase money has been sufficient to pay £17 19s. on every £7 share.

The Electric Lighting Committee of the Sheffield City Council are complaining of the rating of their machinery and cables. The amount payable had been increased from £393 per annum to £1956; and the Committee have decided to appeal against the assessment. The proprietors of gas undertakings can sympathize with them.

At the meeting of the Stafford Town Council last Tuesday, the Chairman of the Gas and Electricity Committee reported that the business of the Electric Lighting Department during the year had been very successful. The total revenue was £1443, and the working expenditure £791. For the first time the works had been able to pay the expenses, together with the interest on the loan, and, in addition, contribute £72 towards repayment of principal.

There was another failure of the electric light in Brighton last Thursday evening, from which users of electricity as motive power suffered more than the general body of consumers; the stoppage occurring before darkness set in. Those firms, however, who use artificial light in the daytime also found themselves in difficulties. There was nothing wrong at the works on this occasion, the failure being attributed to the piercing of a cable by an excavator's pick. This, it is said, developed a fault in another cable; the result being such a leakage as to prevent the pressure from being kept above 85 volts, instead of 115 volts, until the faults were located. Those who relied on electricity for working engines or machines found their plant useless for more than half an hour; and though the damaged cables were disconnected in time to prevent interference with public and private lighting as a whole, a small area had to remain in darkness when it should have been illuminated.

Alderman S. T. Mander, Chairman of the Lighting Committee of the Wolverhampton Corporation, submitted his annual report at the meeting of the Council yesterday week. He congratulated the town on the undertaking having made a profit of £1004, and said the concern might now be regarded as a paying one. The Local Government Board had sanctioned the borrowing of £28,870 for purposes of electric lighting; and he believed that when the three-wire system of distribution was completed, there would be greater economy in working, and higher profits would accrue. The profit of £1004 represented about 7½ per cent. on their capital; and as a trading concern this return must be regarded as satisfactory. He regretted that there had been a breakdown in the supply of the light; but this was not likely to occur again when additional machinery had been laid down. During the four years' existence of the concern, the number of lamps connected has increased from 8941 to 19,932, and the consumers from 113 to 276; and, while there was a loss on the first year's working, a progressive profit has since been earned.

A special report of the Board of Trade has been laid on the table of the House of Commons in regard to the Provisional Orders under the Electric Lighting Acts of 1882 and 1888, made, in respect of the City of London, upon applications by the Charing Cross and Strand Electricity Supply Corporation, Limited, the Metropolitan Electric Supply Company, Limited, and the Smithfield Markets Electric Supply Company, Limited. From this report it appears that originally the Corporation of the City of London, as the Local Authority under the Electric Lighting Acts, were unable to consent to either of the three applications, having regard to the terms of certain agreements entered into by them with the City of London Electric Lighting Company, Limited, who are supplying electricity in the City under the City of London Electric Lighting Orders of 1890 and 1891. Under the circumstances, an inquiry with respect to the three applications was held by Sir Courtenay Boyle, the Permanent Secretary to the Board of Trade; and, after consideration of his report, the Board decided to dispense with the consent of the Local Authority in respect of the application of the Charing Cross and Strand Electricity Supply Corporation, Limited, and to grant an Order to that Company, subject to the following conditions: (1) That a clause be inserted requiring the Company, within two years from the commencement of the Order, to establish a separate generating station for the purposes of the City undertaking. (2) That power be given to the Corporation to purchase the City undertaking at any time after the expiration of a reasonable time (to be hereafter settled), from the commencement of the Order, on terms to be agreed upon between the Corporation and the undertakers, or in default of agreement to be determined by arbitration. The Corporation suggested that the date of the purchase should be Dec. 31, 1907, and that they should be at liberty to purchase the undertaking at its cost *plus* 10 per cent.; a guarantee being given to the shareholders to make up their dividends in the interim to an average of 4 per cent. per annum. They also suggested that they should have the right to purchase part only, and not necessarily the whole, of the undertaking in the City; their main object being not to be compelled to purchase the generating station if it were erected outside the City boundary. Sir Courtenay Boyle has now amended the Order by making the date of the purchase 1914, and by giving the Corporation the power of approving the site of the generating station; but, in return, he makes it obligatory upon them to buy the station, wherever it may eventually be situated, in the event of their purchasing the City undertaking of the Company.

A long discussion took place in the Weymouth Town Council, at their last meeting, on the subject of the proposed introduction of electric lighting into the town. The Council have a Provisional Order, and have decided to carry out a scheme themselves. They accordingly appointed an Electric Light Committee; and a deputation consisting of two members (Messrs. Whettam and Honebon), accompanied by the Borough Surveyor (Mr. W. Barlow Morgan), visited Brighton and Tunbridge Wells, inspected the electric light works there, inquired into the whole question of the electric lighting of those towns, and embodied their views in a report which was presented to the Council on the above-named occasion. They recommended "that an expert be appointed to advise the Council as to the best means of lighting the borough by electricity." Appended to the report was a table showing the cost of electricity at Brighton according to the number of hours it is used, irrespective of the size of the installation. The following figures were given as the comparative cost per annum of an electric lamp (including renewals) and an ordinary gas-burner, each of 8-candle power, and with gas at 2s. 9d. per 1000 cubic feet:—

	Electric Lamp.		Gas Burner.
Outside lamps	19s.	4½d.	47s. 3d.
Clubs and billiard-rooms	12	2	23 7
Hotels, &c.	11	0	19 8
Sitting-rooms, halls, kitchens, basements, and late-closing shops	9	9½	15 9
Shop interiors	8	7	11 9
Shop windows	7	5	7 10
Early-closing shops	6	2	3 11

Mr. Whettam, in presenting the report, said that both at Brighton and at Tunbridge Wells, his colleague and he were most favourably impressed with the system of electric lighting in use, having regard to the quality of the light, the installations in private houses, and the profit made towards the reduction of the rates. Notwithstanding all that they had been told by detractors, it was clear that a large profit was realized, especially from the public lighting and the small private consumers. He moved the adoption of the recommendation. Mr. Honebon seconded the motion, and reviewed the steps which the Council had taken in the matter of electric lighting. Mr. Chave said he should like to "third" the motion, if the proposer and seconder would consent to the insertion of the words "as to the estimated cost of and" before "the best means of lighting the borough." They all desired to do what was best in regard to the town in this matter; but they had to consider one item only, and that was whether the thing was going to pay and result in profit, or to be a burden on the town. Mr. Higgs said that, before pledging themselves to engage an expert, they ought to know something about what the cost of his services would be. Quoting from a return, he pointed out that, out of the 49 boroughs or towns which had adopted electric lighting, 32 had incurred a loss—the losses amounting to £27,917. Only 12 had made a profit—the profits amounting to £37,373. But these profits were principally in large towns. What they had to decide was whether they in Weymouth were in a position to run the risk of losing £1000 or more a year for the term of twenty or thirty years during which they would be repaying the loan with interest. If they had to take a considerable sum from the rates every year to make up for the loss on the works, they would be doing a great injustice to the town. He moved, as an amendment, that the report be referred to the whole Council in Committee, to be carefully considered. The Mayor (Alderman Templeman) expressed the hope that Messrs. Whettam and Honebon would accept the amendment, in order to allow more time for the consideration of this important matter. Mr. Whettam said he did not feel disposed to withdraw his motion. He had given about three months of his time to this question, and thought it would be casting a slur upon what Mr. Honebon and he had done if the Council threw it over, and began the consideration of the matter anew. After some discussion, the amendment was defeated by 19 votes to 5; and the motion was carried. The Council are to be called together at an early date to choose an expert.

Godalming Water Supply.—As the result of a compromise between the promoters of the Godalming Corporation Water Bill and the outside areas affected, the Bill has past its critical stages in the House of Commons. By the terms of the compromise, which have been embodied in the Bill in the place of the clause to which the promotors objected, the borough and the outside areas will share whatever profits accrue from the undertaking in the proportion of the water-rents collected from each of the two areas during each year.

The Colwyn Bay District Council and the Gas-Works.—At the last monthly meeting of the Colwyn Bay District Council, the Chairman (Mr. G. Bevan) moved, in relation to the interview of the Finance Committee with the Directors of the Colwyn Bay and District Gas Company, that the Council authorize the Clerk to make application to the Local Government Board for power to purchase the Company's undertaking, and to supply gas, in pursuance of section 77 of the Colwyn Bay and District Gas Act, 1896; and also to give the Company six months' notice in writing of their desire to purchase.

New Joint Stock Companies.—The Compressed Gas Company Syndicate, Limited, has been registered with a capital of £10,000, in £50 shares, to acquire the assets of the Compressed Gas Company, Limited (in compulsory liquidation), and to manufacture and deal in carbolic acid gas, &c. The Kovno Water-Works Company, Limited, has been registered with a capital of £100,000 in £1 shares, to acquire a concession granted by the Municipality of Kovno, to enter into an agreement with P. P. O'Brien de Lacy and J. S. Veniarsky, and to carry on in the town of Kovno and the surrounding districts the business of a Water-Works Company.

THE LONDON COUNTY COUNCIL AND THE WATER QUESTION.

Work for Next Session.

At the Meeting of the London County Council last Tuesday, the Water Committee brought up the report, referred to in our editorial columns last week, in which they recommended the suspension of the Standing Orders, so far as they would affect proposals for legislation in the session of 1900 dealing with the Metropolitan Water Supply, and asked to be authorized, if they deemed it advisable, to recommend application to Parliament on this subject at any time not later than Nov. 14 next. After reviewing the facts which have led up to the present situation, the Committee said: "While the Council's efforts to carry into effect the accepted policy of purchase have been hindered, the numerous applications by the Water Companies to Parliament for greater powers have been, in almost every case, allowed to go forward. Since 1889, no less than sixteen Acts of Parliament have been obtained by various Companies, conferring upon them large powers of borrowing money and executing works. The authorized capital (share and loan) of all the Companies in 1889 was £15,383,777. It is now £23,392,252. Over £6,000,000 of this new capital has been authorized since 1895—that is to say, since the Council's first Purchase Bills passed the second reading. Thus, during the last four years Parliament has entirely altered the position of several of the Metropolitan Water Companies, and has done this in opposition to the expressed wishes of the representative body of the Metropolis, and greatly to the detriment of the London ratepayers. It is true that after very severe contests the Council has succeeded in maintaining the obligation imposed on the Companies of providing a sinking fund towards the purchase of the undertakings; but even this protection to the public has been withdrawn in the case of the Bill promoted in the present session by Her Majesty's Government, who, in opposition to the recommendation of a Select Committee of the House of Lords, have now, for the first time in thirteen years, given the Water Companies power to borrow money without making any payment whatever to the sinking fund in respect thereof. A further protection to the public, first obtained in the year 1896, having the effect of preventing the Companies, in the event of purchase, from claiming any enhancement of value in respect of the new powers conferred, has also been successfully maintained by the efforts of the Council until the present session. This year, however, the East London Company have succeeded in the House of Commons in obtaining new powers to the extent of £1,500,000 without the provision against enhancement of value; and these powers have been granted notwithstanding the fact that the works proposed to be executed thereunder have formed the subject of a lengthy consideration by the Royal Commission which has not yet reported, and in opposition to a report of the responsible permanent advisers of the Local Government Board, who gave it as their opinion that the provision contained in the Government's Bill would be quite sufficient to protect the east of London from any repetition of a water famine, and that the East London Company's Bill was therefore unnecessary. We have thought it right to lay these facts before the Council, because it will readily be seen that the position of the Council is one of great difficulty. The water question of London is not what it was five years ago. The Companies have obtained rights of further drawing upon rivers, even without the sanitary restrictions recommended by Lord Balfour's Commission. Very large amounts of money are now, with the authority of Parliament, being sunk in providing new supplies from sources which, in the opinion of the Council and of Engineers like Sir Benjamin Baker and Mr. Deacon, are not the best; and all this has been done pending the consideration of a question which, in February, 1896, Her Majesty's Government announced themselves as intending to settle. There is little doubt that the settlement, when it comes, will be far more onerous to the ratepayers than it would have been had the Council's proposals been dealt with fairly and allowed to go forward in 1896. At the same time, although the price to be paid may prove to have been enhanced by the circumstances of the past few years, it is still probable that an immediate purchase of the water undertakings on fair terms will be the wisest course for the ratepayers of the Metropolis. The process of rehabilitating the Companies will doubtless be continued in coming sessions, with the object of ultimately making purchase financially impossible; and the consumers will find themselves left permanently at the mercy of private undertakings without even the means of escape which at the present moment the position of some of the Companies affords them. It is, however, impossible for us to do more at this juncture than direct the Council's attention to the matter. When the Royal Commission's report is issued, it will then be our duty to give it our closest attention, and carefully to consider what course we shall recommend the Council to adopt. We hope that the report will be out before the Council adjourns for its summer recess; but, in any case, it is hardly probable that we shall be in a position to present our own views to the Council before the autumn."

Mr. Beachcroft deprecated the inconsiderate language hurled at the head of the Government in the report. Mr. Cohen, M.P., said they all desired this matter to be settled; but if Mr. Dickinson and the Committee put themselves in opposition to the Government, they were doomed to failure, and they were squandering the ratepayers' money in controversies which could only end in their own discomfiture. Mr. Shaw Lefevre thought that, under the circumstances, the Committee's report was of a very moderate character. Mr. Dickinson (the Chairman of the Committee) said that for years the opinion of the Progressive party and a large proportion of the Moderate party had been in favour of purchase; and yet the Council had not been allowed to place its proposals before a Committee of the House of Commons. The treatment meted out to the Council in this respect would not have been accorded to any other town in the kingdom. He expressed the belief that the Royal Commission would report that the requirements of London demanded a further supply; and the Welsh scheme recommended by the Council would, in all probability, be the only one possible for the Metropolis.

The recommendation of the Committee was agreed to.

Water-Rates in the Bolton District.—The Local Authorities round Bolton have for some time been agitating for lower charges for the supply of Corporation water to the out-townships; and the movement has at length resulted in the formation of a Water Board to consist of one member and the Clerk of each of the following Authorities: Clifton, Farnworth, Kearsley, Little Hulton, Turton, and Worsley.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 1652.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 13	10½	Alliance & Dublin 10 p. c.	21⅛—22⅛	..	4 18 4
100,000	10	"	7½	Do. 7 p. c.	15½—16½	..	4 10 11
800,000	100	Jan. 3	5	Australian 5 p. c. Deb.	104—106	..	4 14 4
200,000	5	May 12	6	Bombay, Ltd.	6⅛—7	..	4 5 9
40,000	5	"	6	Do. New, £4 paid	4⅞—4¾	−¼	5 1 1
380,000	Stk.	Feb. 24	12	Brentford Consolidated	275—280	..	4 5 9
240,000	"	"	9	Do. New	215—220	..	4 1 10
50,000	"	"	5	Do. 5 p. c. Pref.	140—145	..	3 9 0
159,375	"	June 15	4	Do. 4 p. c. Deb.	126—130*	−¼	3 1 7
220,000	Stk.	Mar. 29	11½	Brighton & Hove Orig.	265—270	..	4 5 2
226,320	"	"	8½	Do. A. Ord. Stk.	194—197	..	4 6 4
973,500	Stk.	Feb. 24	5	Bristol, 5 p. c. max.	125—130	..	3 16 11
420,000	20	Mar. 29	10	British	47—49	..	4 1 8
50,000	10	Feb. 24	12	Bromley, Ord. 10 p. c.	25—27	..	4 8 11
75,000	10	"	9	Do. 7 p. c.	20—22	..	4 1 10
500,000	10	Apl. 27	6	Buenos Ayres (New) Ltd.	10—10⅛	−⅛	5 14 3
220,000	Stk.	Dec. 30	4	Do. 4 p. c. Deb.	103—105	..	3 16 2
150,000	20	Mar. 10	8½	Cagliari, Ltd.	38—39	..	5 13 10
100,000	10	June 1	7½	Cape Town & Dis., Ltd.	13—14	..	5 7 2
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	56—58	..	5 3 5
550,000	Stk.	Apl. 13	13½	Commercial Old Stock	312—317	..	4 5 2
200,750	"	"	10½	Do. New do.	245—250	..	4 4 0
200,750	"	June 15	4½	Do. 4½ p.c. Deb.	143—148*	+½	3 0 10
800,000	Stk.	June 15	10	Continental Union, Ltd.	190—195*	..	5 2 7
200,000	"	"	7	Do. 7 p. c. Pref.	182—187*	+½	3 14 10
51,600	Stk	Feb. 24	14	Croydon A 10 p. c.	—	—	—
168,400	"	"	11	Do. B 7 p. c.	—	—	—
555,000	Stk.	Feb. 24	5½	Crystal Palace Ord. 5 p. c.	133—138	..	3 16 2
60,000	"	"	5	Do. 5 p. c. Pref.	140—145	..	3 9 0
486,090	10	Jan. 27	11	European, Ltd.	23—24	..	4 11 8
354,060	10	"	11	Do. £7 10s. paid	17—18	..	4 11 9
14,998,075	Stk.	Feb. 10	4⅝	Gas-light and Coke	4 p. c. Ord.	110—112	−2	4 7 6
2,600,000	"	"	3½		3½ p. c. max.	100—102	−1	3 8 8
8,799,735	"	"	4		4 p. c. Con. Pref.	127—129	..	3 2 0
3,843,975	"	June	3		3 p. c. Con. Deb.	99—101*	..	2 19 5
70,000	10	May 31	8	Hongkong & China, Ltd.	13¼—14¼	..	5 10 4
3,800,000	Stk.	May 12	10	Imperial Continental	223—228	−2	4 7 9
473,600	Stk.	Feb. 10	3½	Do. 3½ p. c. Deb. Red.	102—105	..	3 6 8
75,000	5	June 15	6	Malta & Medn., Ltd.	4⅞—5⅛*	..	5 14 3
560,000	100	Apl. 4	5	Met. of Melbourne	5 p. c. Deb.	112—114	..	4 7 9
250,000	100	"	4½		4½ p. c. Deb.	110—112	..	4 0 4
541,920	20	May 31	5	Monte Video, Ltd.	13—14	..	7 2 11
617,946	Stk.	Feb. 24	9½	Newc'tle & Gatesh'd Con.	228—233	..	3 19 5
264,855	Stk.	Dec. 30	3½	Do. 3½ p. c. Deb.	107—110	..	3 3 8
					* Ex div.		

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
150,000	5	May 31	8	Oriental, Ltd.	7⅞—8	..	5 0 0
135,000	5	"	8	Do. New, £4 10s. pd.	6⅞—7	..	5 14 3
15,000	5	"	8	Do. do. 1879, £1 pd.	1¼—1⅜	..	4 11 5
60,000	5	Mar. 29	7	Ottoman, Ltd.	5—5½	..	6 7 4
500,000	100	June 1	6	People's Gas 2nd Mtg. of Chicago Bonds	102—106	..	5 13 2
851,070	10	Apl. 27	7	River Plate Ord.	11¼—11⅝	−⅛	5 19 2
250,000	Stk.	Dec. 30	4	Do. 4 p. c. Deb.	103—105	..	3 16 2
250,000	10	Mar. 29	10	San Paulo, Ltd.	16⅞—17½	..	5 14 3
135,000	Stk.	Mar. 29	10	Sheffield A.	237—240	..	4 3 4
209,053	"	"	10	Do. B.	237—240	..	4 3 4
447,427	"	"	10	Do. C.	237—240	..	4 3 4
5,600,000	Stk.	Feb. 10	5½	South Metrop., 4 p.c. Ord.	135—140	−2½	3 16 2
1,460,000	"	Jan. 13	3	Do. 3 p.c. Deb.	101—103	..	2 18 3
—	—	—	—	Tottenham and A.	—	—	—
—	—	—	—	Edmonton B.	—	—	—
182,380	10	June 15	5	Tuscan, Ltd.	9—10*	+½	5 0 0
149,900	10	Jan. 3	5	Do. 5 p.c. Deb. Red.	99—101	..	4 19 0
				WATER COMPANIES.			
746,184	Stk.	Dec. 30	11	Chelsea, Ord.	318—323	..	3 8 1
150,000	"	"	5	Do. 5 p.c. Pref.	168—173	..	2 17 10
160,000	"	"	4½	Do. 4½ p.c. Pref. '75	150—155	..	2 18 1
175,785	"	Mar. 29	4½	Do. 4½ p.c. Deb.	155—160	..	2 16 3
1,720,560	Stk.	Apl. 13	7	East London, Ord.	220—224	..	3 2 6
654,740	"	Dec. 30	4½	Do. 4½ p. c. Deb.	157—160	..	2 16 3
390,000	"	"	3	Do. 3 p. c. Deb.	102—104	..	2 17 8
700,000	50	June 15	7½	Grand Junction 10 p. c. max.	111—114*	..	3 5 9
310,000	Stk.	Mar. 29	4	4 p. c. Deb.	135—140	..	2 17 2
708,000	Stk.	Feb. 10	14	Kent	360—365	..	3 16 9
160,000	"	"	7	Do. New, 7 p. c. max.	210—215	..	3 5 1
1,043,800	100	Dec. 30	10½	Lambeth, 10 p. c. max.	303—308	..	3 8 2
406,200	100	"	8	Do. 7½ p. c. max.	230—235	..	3 8 1
350,000	Stk.	Mar. 29	4	Do. 4 p. c. Deb.	135—140	..	2 17 2
500,000	100	Feb. 11	13¾	New River, New Shares	430—435	..	3 3 3
1,000,000	Stk.	Jan. 27	4	Do. 4 p. c. Deb.	137—142	..	2 16 8
902,300	Stk.	June 15	7½	South-wark and Ord.	206—211*	..	3 11 1
126,500	100	"	7½		193—196*	..	3 15 9
489,200	Stk.	"	5	5 p. c. Pref.	165—170*	..	2 18 10
1,019,585	"	Apl. 13	4	Vauxhall 4 p. c. A Deb.	135—140*	..	2 17 2
1,155,066	Stk.	June 15	10	West Middlesex	297—302*	..	3 6 3
200,000	"	"	4½	Do. 4½ p. c. Deb.	154—158*	..	2 17 0
200,000	"	Mar. 10	3	Do. 3 p. c. Deb.	102—104	..	2 17 8

SOUTHWARK AND VAUXHALL WATER COMPANY.

The Half-Yearly Ordinary General Meeting of this Company was held at the Offices, Southwark Bridge Road, last Tuesday, under the presidency of Alderman Sir H. E. Knight.

The Secretary (Mr. Montague Watts) read the notice calling the meeting; and the report of the Directors was taken as read.

The Chairman, in moving the adoption of the report and accounts, said that the Directors were very glad indeed to meet the proprietors again, and to be able to congratulate them on the favourable circumstances in which they were assembled, in view of the difficult times which had been passed through since the last general meeting of the Company. Passing to the accounts, he remarked that they were very simple, and that the differences in them as compared with those for the corresponding period of last year were of a character very easily explained. The capital account was overspent by no less than £70,000. This was a much larger amount than was usual at this time of the year—a circumstance which was owing, to a great extent, to the fact that the Company had had to pay for the Apps Court estate at Molesey, on which, under their Act of 1898, they were obliged to construct additional storage reservoirs. This unusual debit to capital account would oblige the Company at once to raise an additional number of "B" debentures; and this year the Directors thought it necessary to raise £150,000, instead of £100,000, as usual, as they desired to keep the equilibrium between capital expended and capital raised as fairly as had been done in the past. He and his colleagues on the Board held that they had faithfully carried out the intention of Parliament by raising the "B" debentures in the middle of the year, so that if the expenditure for that year, say, was £100,000, £50,000 was spent in anticipation and the other £50,000 after the £100,000 had been raised, so that the incidence of the liability of the capital so raised came fairly to represent the year's expenditure. Turning to the revenue account, he stated that the outlay on maintenance during the half year to March last had been £53,211; being an increase of £5236 as compared with the expenditure for the corresponding period of the previous year. This excess was accounted for by repairs, and by strengthenings to the 42-inch main, a portion of the expenditure on which would be charged to capital, as arranged with Mr. Stoneham. The Company had also had to pay an agreed sum of money, under arrangements with the Middlesex County Council, for the repair of Hampton Court Road—an obligation which Parliament imposed on the Company, in their Bill of 1898. Further, a considerable sum had been expended on mains which had been found to be laid too near the surface of the ground to meet a very severe frost; and he might say that this was a point which the Directors were continually attending to. Coal had cost the Company a little more, on account of its higher price; but rates and taxes, as usual, exhibited a considerable increase—no less than £348 in the half year. These items represented and accounted for the increase of £5236 under maintenance; but he need not inform them that some of them would not occur again—for instance, the repair of the Hampton Court Road and the outlay on the 42-inch main. In regard to management, an increase of £3443 was shown as compared with the expenditure in the corresponding period of last year. This was very easily accounted for. No less than £2500 of the amount was made up of law and parliamentary expenses, which had been incurred in protecting the interests of the proprietors, in consequence of the unjustifiable attacks which were made year after year on their property by the London County Council. Under the two heads of maintenance and management, there had thus been an increase in the expenditure of £8679. The other side of the account was, however, pleasurable to contemplate. The item which he had referred to year after year of allowances for empty houses, overcharges, and bad debts was still decreasing; amounting last March to only £3500, whereas when he first became Chairman it figured for many thousands of pounds. The decrease in this item showed how much better the Company's business was looked after. The water-rents accrued to date of the accounts amounted to £133,947; being an increase over those of the corresponding period of 1898 of no less than £7464. He regarded this as exceedingly satisfactory; and it was even more so if the figures for the whole year were taken. For the half year to Sept. 30, 1897, the water-rents accrued amounted to £131,889; and for the next six months, to £126,483—or a total for the year ended March, 1898, of £258,372, as compared with £271,907 for the year to March last, showing an increase this year over last of no less than £13,605. The Company's undertaking thus continued in a very prosperous condition. The last item in the account which he would deal with was the amount carried to dividend and interest account for transfer of profits, which was £68,085, or £1108 less than it was at March, 1898, notwithstanding the satisfactory increase in the Company's income. This, however, was accounted for by what he had already explained—the increased expenditure on maintenance and management of £8679 as compared with £7469 in the March half of 1898, leaving a difference against the present half year of £1215. Allowing for interest accrued and the dividend on the preference stock, £44,469 was available for dividend, or £2875 less than at the corresponding period of last year. The Directors were, however, enabled to recommend a dividend of 7½ per cent. per annum; thus maintaining, he was very glad to say, the increased dividend which was declared at the last half-yearly meeting. They had been able to maintain the dividend because the handsome balance of about £14,000 was carried forward last time, whereas only about £6000 would remain to be carried forward on the present occasion. At the corresponding period of last year, however, a dividend of only 6 per cent. was paid, and about £13,000 was carried forward; but 1½ per cent. more dividend was now recommended, and the prospects of the Company were of such a nature that the Directors thought they were quite justified in recommending this. The report of the Directors was satisfactory. At the Wharncliffe meeting of the Company last February, the proprietors authorized an application being made to Parliament by the Directors for a Bill for the purpose of establishing intercommunication between the mains of the different Companies. This Bill had also to be kept in the forefront, as it was impossible to know what might happen in connection with the Government Bill; but the Government succeeded in getting a measure passed which he did not think would be injurious to the Water

C. & W. WALKER, Ltd.

Midland Iron-Works,

DONNINGTON, near NEWPORT, SHROPSHIRE.

110, CANNON STREET, LONDON, E.C.

Telegraphic Addresses:
FORTRESS DONNINGTON SALOP"
"FORTRESS LONDON."

CODES USED:
A.B.C. (4th EDITION
AND A.1.

Weck's Patent CENTRE-VALVE

Weck's Patent CENTRE-VALVE

PERFECTLY TIGHT UNDER EVERY EXTREME OF HEAT OR COLD.

THE ONLY ABSOLUTELY RELIABLE CENTRE-VALVE IN THE MARKET.

Companies, and from which the latter might some day derive considerable benefit, if an emergency arose. The Company had proceeded fairly and honestly with the work of intercommunication. They had laid a large main from their works at Nunhead, which would enable them at once to give the East London Company assistance, should the latter need it. The East London Company had already applied to them to begin to put water into their reservoirs, so that they might obtain a reserve supply to meet any emergency in their district, no matter what the weather might be. The Companies would no doubt now proceed under the Act which had received the Royal Assent. They would meet together, and place before the Local Government Board a complete system of intercommunication, which would no doubt be of great advantage should any emergency arise in the future. After explaining how the scheme would be carried out, and the expense which was to be borne by the different Companies, he stated that rapid progress had been made with the Company's works at Hampton. Their new range of filters on the southern side of the Lower Sunbury Road was finished; and a similar range on the northern side of the road was now being pushed forward. Of the three enormous engines erected at Hampton, one was at work and another was nearly completed, so that in a very short time two of them would be available. Nor had any time been lost in carrying out the construction of the new reservoir at Nunhead under the Company's Bill of 1894. This would place them in possession of a very large extra supply of filtered water in case of emergency.

Mr. C. M. Vialls seconded the motion, which was at once carried unanimously.

The Chairman afterwards proposed the payment of dividends at the rates of 5 per cent. per annum on the preference stock, and 7½ per cent. per annum on the ordinary stock and class "D" shares.

Dr. Chesshire seconded the motion, which was carried unanimously.

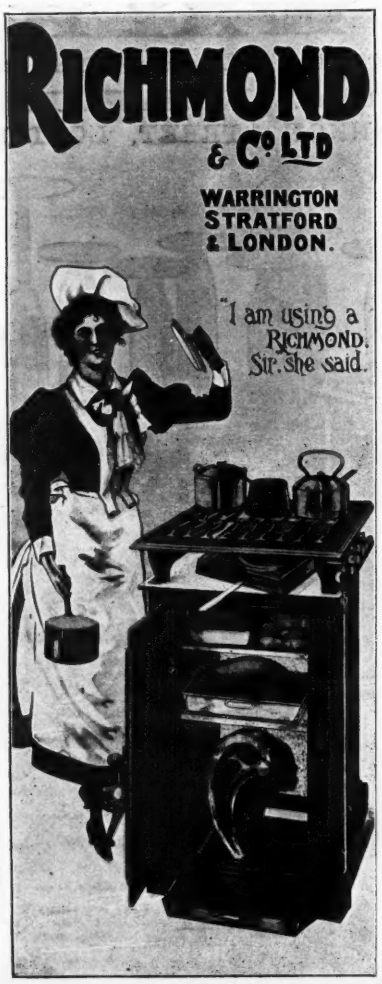
The proceedings then terminated with a vote of thanks to the Chairman, Directors, and officers of the Company.

GRAND JUNCTION WATER-WORKS COMPANY.

The Ordinary Half-Yearly General Meeting of this Company was held at the Office, South Molton Street, W., last Wednesday, under the presidency of Mr. F. Tendron, F.G.S.

The Secretary (Mr. J. Goodwin) having read the notice calling the meeting,

The Chairman moved the adoption of the report and accounts. The entry in the revenue account of special expenditure had, he remarked, now appeared ever since the great frost; but fortunately an end had been arrived at of the large outlay which that frost cost the Company, both directly and indirectly. The Directors had felt it incumbent on them to lower all the mains in the Company's district which were affected by the frost, in order that any recurrence of the great inconvenience which their customers suffered during the spring of 1895 might be avoided. The Company were now in this happy position—that their surplus income over all expenditure, including the dividend now recommended at 7½ per cent., was available to meet the expenditure which would be brought upon them by the Staines reservoirs. The exceptional entry for law charges—or parliamentary expenses—of £2000 represented the amount which the Directors had paid, or which they considered the Company were liable for, towards the outlay which had been incurred for professional assistance before the Royal Commission. No later than February last the London County Council actually wrote to the Local Government Board asking whether any parallel could be drawn between the epidemic at Maidstone and one that might occur in London from the water that was supplied from the gravel beds. The water which had been supplied to the people of Maidstone had come direct from a polluted spring; that supplied by the London Companies passed through an enormous amount of ground before reaching the collecting grounds. There was also the essential point of difference that, while the Maidstone water was delivered to the consumers unfiltered, the London water was filtered to such an extent that the entry of over 99½ per cent. of even minute microbes was prevented. If the County Council succeeded in obtaining control of the London Water Supply, they would draw on the very same sources as the Companies did—and not only for many years to come, but it might be said for all time, inasmuch as the County Council admitted before the Royal Commission that to the extent of 185½ million gallons daily the Thames must be the source of supply. Out of this 185½ million gallons daily which the Companies were entitled to take from the Thames, they would have, as soon as the Staines reservoirs were completed, no less than 36 million gallons daily under ordinary and 39½ million gallons daily under exceptional circumstances. This supply would be sufficient to enable the Company to meet the wants of their district up to 1937, allowing for a liberal increase of population, based upon the tables submitted to Lord Balfour's Commission. The Company had thus been placed in a splendid position by having associated themselves with the New River and the West Middlesex Companies to carry out the scheme which originated with Mr. Walter Hunter—now the Company's Engineering Director, and with the late Mr. Fraser, their former Engineer. This was something to be proud of, as well as something to be extremely satisfied with; for the question of the future water supply was almost the key position to everything which came before the present Royal Commission. But such a position as the Company now occupied could not be attained without paying something for it; and practically what the shareholders paid was this—that while all the expenditure necessary in consequence of the great frost had been completed, instead of reverting to the 8½ per cent. dividend which they used to enjoy, and receiving the additional net earnings which the Company were now making, and which would enable the Directors to pay 9 per cent., the Board intended to declare only 7½ per cent., and they did not hold out any anticipation of increasing this rate, although they expected, apart from Staines, that the net earnings of the Company would steadily increase, until by 1903 (when the Staines reservoirs would come into operation) they would be earning a clear 10 per cent. dividend. The reason for this course was, however, clear. The Company's share of the interest on the debenture stock which had been



raised to pay for the works at Staines would amount, including management expenses, to £13,000 per annum, which was their present surplus income over the dividend of 7½ per cent. The Company were therefore in a position to meet this interest in 1903; but so soon as the water was got into the reservoirs provision would have to be made for a sinking fund, the payment to the Thames Conservancy, and rates and taxes—the whole amounting to £22,000 a year. Therefore the Directors had to look to the increase in the Company's income for the other £10,000. Their gross income augmented at the rate of £5000 a year; but in the past half year the improvement had been considerably more, and their net earnings had steadily advanced. The Board had every reason, therefore, to believe that the growth of the Company's net earnings would be sufficient by 1903 to meet the additional charges mentioned of £22,000 a year. But, to be perfectly sure, a balance was now carried forward of £11,000, as a dividend guarantee fund; and, as the full charge for interest only came gradually, the Directors would be able in the meantime to put by the difference between the net earnings and the actual payments for interest. If things went on as the Board hoped they would do, this guarantee fund ought by 1903 to amount to between £25,000 and £30,000. There was thus a large margin; and therefore, although, as at previous meetings, he had given the shareholders the unpleasant news that their dividend would not be increased beyond 7½ per cent. for some time to come, yet he had shown that they could look upon this distribution as absolutely secure. He knew of no special expenditure to come which would interfere with this position excepting parliamentary charges; but these, by a decree of the London County Council, the Company would not escape from. For the moment, the County Council were not abusing the Water Companies, but the Government. The Progressive members had, however, a majority; and the Council, in order to enable them to take further proceedings in 1900, were going to bring in a Bill at the end of the year for the purchase of the undertakings of the Companies. He might mention that while, during the tremendous heat which had lately been experienced, the Company were able to increase their daily supply from 18 million gallons to 24½ million gallons, and on one day to 25 million gallons (so that no restrictions might be placed on their consumers), the great town of Birmingham was in such a position that the Municipality, in whose hands the water-works had been for years, had been obliged to impose restrictions as to garden and lawn watering; and they were also afraid that they would have to shorten the hours of supply. He could congratulate the shareholders not only on the position which their own Company had attained, but also on the greatly improved position which was held by all the London Water Companies in public estimation. He also desired to point out clearly that if the Company's undertaking were purchased, the shareholders had a fair claim for repayment, in the form of dividend earned, for all the money which they were spending on account of Staines. This had nothing to do with the ordinary revenue of the Company; and they were sacrificing so much of dividend year after year in order to provide for the future.

Mr. H. Mott seconded the motion.

Dr. Leeson said he thought it would be well if a circular could be issued informing the consumers that unless they lowered their own pipes they would be frozen out as regarded their water supply, notwithstanding the expenditure which had been incurred by the Company in lowering their mains where this proceeding had been necessary.

The Chairman said he desired, before putting the motion, to refer to a matter which he had overlooked—namely, that the intercommunication pipes which the Company were laying to ensure assistance to the East London Company were very nearly finished. Mr. Hunter hoped that within a month the whole of the new work connected with this object would be completed.

The motion was then put and carried unanimously.

The Chairman next proposed the declaration of dividends for the last financial half year at the rates of 7½ per cent. per annum on the £50 "A" shares, the £25 "B" shares, and the £25 "C" shares, and of 7 per cent. per annum on the £50 "D" shares; the warrants for paying the same to be issued on and after the 15th prox.

Viscount Knutsford, G.C.M.G., seconded the motion.

Mr. Bellewes, in supporting the resolution, stated that in other matters he had had some experience of the way in which the London County Council required to be fought; and he therefore desired to say that the shareholders were under a very heavy debt of gratitude to the Chairman and Directors for the care and skill with which they had met the County Council at every turn. He was sure that the shareholders would be unanimous as to the wisdom of the Directors' policy in maintaining the dividend at present at 7½ per cent.

The motion was carried unanimously; and the retiring Directors and Auditor were afterwards unanimously re-elected.

On the motion of Mr. Bellewes, seconded by the Rev. G. Meyrick-Jones, a vote of thanks was passed to the Chairman

The Dry Weather and the Water Supply.—The present dry weather is already causing the Birmingham Water Committee some uneasiness. The Welsh water will not be available for some time, and the present supply is barely equal to the increasing demands. It is not long since the depletion of the storage reservoirs caused by last year's drought was fully made up. A conference of the Surveyors of the city and other Authorities comprised in the water area was held last Tuesday, with a view to concerted measures being taken to minimize the use of water. An arrangement was accepted under which a check will be put on the use of water for street and road sprinkling by degrees, according to the necessities of the situation. It was stated that last year a water famine was averted only by strict economy, and the prospect this year was more serious in that there was a greater population by over 20,000 to be supplied, entailing a daily addition to the consumption of something like 500,000 gallons. Up to the present, no formal application for economy has been issued by the department, as, notwithstanding the large consumption, there has not been any appreciable draft upon the storage. It is certain, however, that in the continued absence of rain a reduction of storage will soon take place. Measures are already being taken to detect cases in which there is a wasteful use of water for gardens, and particularly of lawn watering by means of the hose.

June 17th, 1899.

HAVING TREBLED PRODUCTION CAN
EXECUTE COOKER ORDERS IMMEDIATELY.
CARRYING HEAVY STOCK.

GAS APPARATUS.....LONDON
TOVES.....WARRINGTON
OGEN.....LONDON (FOR STRATFORD)

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Corporation of Glasgow had before them on Thursday the memorial by the gas workers, and the recommendations of the Gas Committee thereanent, which were as follows: (1) That all the workmen engaged in connection with the manufacture of gas, who have been nine months continuously employed at any of the works of the Corporation, should be entitled to three days' annual holiday and pay; and that all such workmen who have been twelve months continuously employed at any of said works should be entitled to five days' annual holiday and pay; (2) that an increase of 1s. 6d. per week be given on the present wages of all the workmen engaged in connection with the manufacture of gas at each of the said works; (3) that in respect of the increase of wages now proposed the request for time-and-half for Sunday labour and overtime be not granted; (4) that the present system of signing agreements of service at the various works be not abolished. The signing of these agreements by the workmen has all along been quite optional on their part; and therefore the employees at all the stations should, in the opinion of the Sub-Committee, still have the right, if their conduct entitles them so to do, to enter into and sign such agreements; (5) that, so far as practicable, the enforcement of the recent resolution of the Corporation, "that ratepayers get the preference of employment," be observed by the station managers at each of the said works; and (6) that, so far as practicable, and the conditions of work at each of the stations will admit of it, there should be equality of work and wages thereat. Mr. Stewart dissented so far as regards recommendation No. 4. The Special Sub-Committee have further to recommend that the foregoing regulations should come into force from and after June 1 next. The recommendations now proposed, if adopted by the Gas Committee and the Corporation, will involve an additional expenditure by the Gas Department of between £9000 and £10,000 per annum. Mr. R. M. Mitchell, the Convener of the Gas Committee, in moving the adoption of the report, said that any competent workman desiring to ensure employment for a certain period could do so by signing the agreement mentioned. He denied that there had been victimization of men who refused to sign. The arrangement had been very much appreciated by the men; and a large number of them had come forward voluntarily and signed. And no wonder, for it assured a man continuous employment for so many months, which would enable him to fix his residence in the neighbourhood. Besides, they had something else to consider. The Gas Committee were, to some extent, trustees for the whole city of Glasgow. It would be an injustice to gas consumers, many of whom were ordinary labourers, if they did not seek to so conduct the works as to provide a steady, regular, and economical supply of gas. They believed that the gas workers had been well treated; and the sum involved in the concessions given represented 1d. per 1000 cubic feet on the price of gas. He believed the men were satisfied; and he trusted the same harmonious terms would prevail between the Corporation and their employees in the gas-works in the future as in the past. Whatever advances of wages were made, he trusted that the Corporation would not deprive the men of the important provision contained in the fourth recommendation. It was a voluntary system, whereby any man, if he wished, could make a contract with his employers, and save the citizens from being put in the unfortunate position of being without gas. Mr. Stewart, a labour member, moved that the recommendation with reference to signing-on be not adopted. He said he voiced the opinion of his constituents. He believed in allowing men to combine, and he had received a petition for presentation to the Town Clerk against the fourth recommendation. It was signed by 700 men in the three gas-works; and of that number one-half had actually signed-on. He contended that in connection with this matter there was a system of victimization in the works; and the Gas Committee and the Corporation were morally responsible, and should see it put right. When men who had served the community faithfully for from 3 to 21 years were summarily dismissed, it behoved them to take into serious consideration whether there was not something to be rectified; and that was what he intended the Council to do. There was one private Company—the South Metropolitan — who enforced this proviso, but it was not enforced in any Corporation gas-works in Great Britain or Ireland. They had been told that they got on remarkably well with their men. That was a pity. He had had deputations from the works stating that the men would rather that the Corporation should keep the 1s. 6d. a week, and other things they had done in the way of bettering their position, if they would do away with this principle of signing-on. Mr. D. M. Stevenson, in support of the motion, said that they could not afford to risk the men saying any day that they were not going to work to-morrow or in fourteen days' time. They could not allow 1500 or 2000 men to have it in their power to deprive the community of the use of gas until they came to terms with the Committee. The proposal was monstrous; and he was sure the Council would never give way to it. As to what was done in other quarters, they had not been in the habit of going to other corporations to learn how to conduct their business. They considered that they were in advance in some matters; and others might follow. With regard to the question of wages, the men were very fairly paid as compared with those employed in other industries. They received from 23s. to 33s. a week for unskilled labour; while 8 per cent. of the users of gas received under £1 a week. On a division, 41 members supported the motion, and 11 the counter motion.

The Perth Gas Commission were occupied two nights this week in the discussion of a motion by Mr. Anderson to the effect that, on account of extra expense incurred in connection with the transference of the gas-works to a new site, the appointment of Mr. Andrew Wilson as Engineer and Manager should be reconsidered. It is a reassuring circumstance that this drastic proposal was supported by only two members of the Commission; the others, to the number of seventeen, supporting a direct negative. I will not enter into details of the speaking at these long and unpleasant sittings. It is enough to say that the minority were not sparing in their denunciation of Mr. Wilson, as being the cause of the delay in erecting the new works, and were surprised that it should be conceived that they were themselves the cause of the delay; while, on the other side, the situation in which the Commissioners find themselves was

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ld.

London Offices: 19, ABINGDON STREET, WESTMINSTER, S.W.
American Offices: TORONTO. TELEGRAPHIC ADDRESS: "CARBURETED, LONDON."

W. H. PEARSON, Chairman.
W. H. PEARSON, Junr., Deputy-Chairman.
J. T. WESTCOTT, M.E., Manager.
L. L. MERRIFIELD, M.Inst.M.E., Engineer.

CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cubic Feet Daily.		Cubic Feet Daily
BLACKBURN	1,250,000	OTTAWA (Second Contract)	250,000
WINDSOR STREET WORKS, BIRMINGHAM	2,000,000	BRANTFORD (Remodelled)	200,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	ST. CATHERINES (Remodelled)	250,000
COLCHESTER	300,000	KINGSTON, PA..	125,000
BIRKENHEAD	2,250,000	PETERBOROUGH, ONT.	250,000
SWINDON (New Swindon Gas Co.)	120,000	WILKESBARRE, PA..	750,000
SALTLEY WORKS, BIRMINGHAM (Second Contract)	2,000,000	ST. CATHERINES (Second Contract)	250,000
WINDSOR STREET WORKS, BIRMINGHAM (Second Contract)	2,000,000	BUFFALO, N.Y..	2,000,000
HALIFAX	1,000,000	WINNIPEG, MAN.	500,000
TORONTO	250,000	COLCHESTER (Second Contract)	300,000
OTTAWA	250,000	YORK	750,000
LINDSAY (Remodelled)	125,000	ROCHESTER	500,000
MONTREAL	500,000	KINGSTON, ONT.,	300,000
TORONTO (Second Contract; Remodelled)	2,000,000	CRYSTAL PALACE DISTRICT	2,000,000
BELLEVILLE	250,000	DULUTH, MINN.	300,000
		CATERHAM	150,000
		LEICESTER	2,000,000
		ENSCHEDE	150,000

AND ADDITIONAL WORK.

set down to the account of Mr. Wilson having too much to do. Both reasons are necessary to the statement of the whole truth. It was certainly a great undertaking, in a place like Perth, with scarcely a staff at all, to conduct the gas-works and produce plans for new works at the same time; but the task was infinitely increased when, as it resulted, the Engineer did not get the support of a section of the Commissioners. Had he done so, the new works would probably have been in full operation by this time. There is prospect of peace now, however, for Mr. M'Vicar, who led the attack, gave his word that he is to criticize Mr. Wilson no longer. So may it be.

The Commissioners had before them the estimates for the current year, which had been prepared by Mr. Wilson. These showed a revenue from gas-rental of £21,625, from slot meters of £1564, gas-stove rentals £175, secondary products £1800, coke £1200, tar £200, and rent of property £39. The total estimated revenue amounts to £29,960. The estimated expenditure for coal is £12,387, lime and oxide £350, wages £3700, salaries £880, repairs and charges £500, meters and furnishings £300, main and service pipes £350, feu-duty and taxes £1200, incidental payments £240, printing, stationery, and advertising £100, and annuities £2812 10s. The interest account—£11,000 at various rates, and (say) £40,000 at 3 per cent.—amounts to £1567 10s. This gives a total of £24,387, to which has to be added £2572 10s. 6d., required by Act to be set apart annually as a sinking fund to repay borrowed money and redemption of annuities. The Commissioners considered these estimates on Thursday. Mr. Cuthbert, the Convener of the Works Committee, in submitting them, said that, of all the good years the Gas Commissioners have had, the year now closed had been one of the best, if not the best. The gas-rental had gone up with a bound. They had received good prices for all their bye-products, and were able to close the year with the substantial balance of £856 to their credit. The Treasurer had given him a few figures showing the rapid increase of gas revenue comparing the year of 1894 with 1899. In 1894, the revenue was £19,297, with gas at 3s. 9d. per 1000 cubic feet; wages, £2881, or 14·93 per cent. of revenue; and salaries, £704, or 3·64 per cent. In 1899, the revenue was £24,496; wages, £3594, or 14·67 per cent.; salaries, £863, or 3·52 per cent. In other words, the make of gas had increased from 96 million cubic feet to 148 millions, and the expenses per cent. had practically been less. He moved the adoption of the estimates, and that the gas-rate be fixed at 3s. 2d. in Perth, 3s. 7d. in Scone, and 3s. 8d. in Tulloch. The motion was unanimously adopted. The price of gas is the same as it has been for some years past.

The Perth Gas Commissioners have now approved of the plans according to which the new gas-works are to be erected. On Thursday night, a minute was read which stated that Mr. A. Gillespie, of Glasgow, had submitted complete plans of the new works, and had given a number of explanations on various points connected with them. The Lord Provost also read to the meeting an approximate estimate of the cost of the work still to be done, which had been prepared by Mr. Gillespie. After some discussion, it was unanimously agreed to approve of the plans submitted; and Mr. Gillespie was instructed to prepare the necessary specifications of work and schedules, to be submitted to a future meeting. Lord Provost Dewar, in moving the approval of the minute, said that he believed they had now got plans of an excellent gas-works which would serve all purposes in Perth for a long time to come. The estimated cost was £39,565, exclusive of £1700 already spent on the holder at the works. They might remember that the estimate for the work, according to Mr. Wilson's original plan, amounted to £72,000. He thought they had now an equally good or better gas-works. They had also to bear in mind that since the original plans were prepared the cost of iron had gone up at least 20 per cent.; while the cost of other portions of the work had increased in price accordingly. Ex-Bailie Cuthbert seconded the motion, which was unanimously agreed to.

The Helensburgh Gas Commissioners have, by the casting vote of Provost Anderson, resolved, notwithstanding the objections of owners and occupiers of property adjoining, to proceed with the erection of a new gasholder at South King Street. It will be necessary to obtain permission from the Sheriff of the county to proceed with the erection of the holder without the consent of owners and occupiers within three hundred yards; and a Committee was appointed to prepare a petition to the Sheriff. The Sheriff in this instance is Mr. Lees, who has some experience of gas-works topics, as he presided at the abortive reference in the matter of the proposed transfer of the Stirling Gas Company's undertaking. There has only been one other petition of the kind—that at Gourock three years ago, in which Sheriff Cheyne, after inquiry, dispensed with consent, and the holder has been erected.

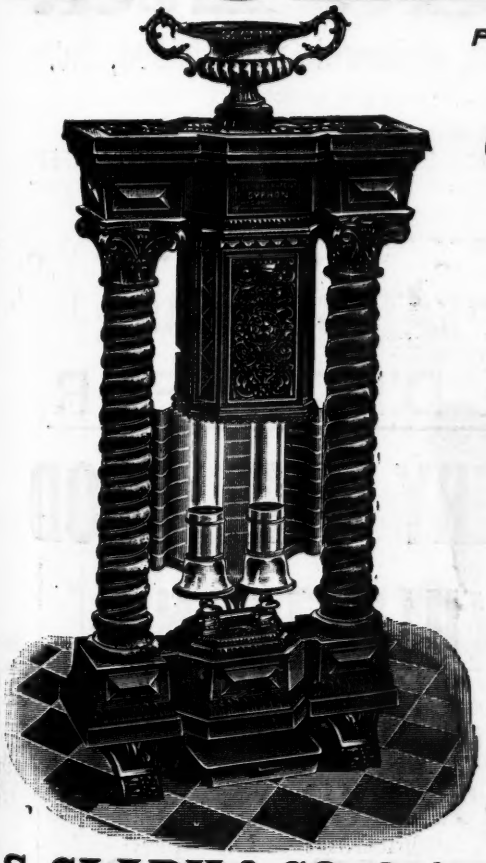
The Dunfermline Gas Commissioners on Monday received the annual report by Mr. Hubert Pooley, their Engineer, in which he stated that the works and mains have all been maintained in an efficient state, and that if the demand for gas continues to increase it will be necessary to extend the carbonizing, condensing, and scrubbing plant in the near future. In the year ending May 15, 7882 tons of coal and cannel were carbonized, producing 77,121,600 cubic feet of gas—an increase of 4,350,200 cubic feet over the previous year, and averaging 9784 cubic feet per ton of coal. Gas accounted for amounted to 71,050,300 cubic feet, or an average of 9014 cubic feet per ton. Unaccounted-for gas amounted to 6,071,300 cubic feet, equal to 7·87 per cent., of the manufacture, as compared with 5,382,400 cubic feet, or 7·39 per cent., in the previous year. The additional leakage was partly due to the loss of gas incident to the laying of large mains, and partly to the fact that there were several very heavy escapes during the year caused by fractured main-pipes. Until nearly the close of the year, very poor prices were obtained for the surplus coke, which has to be disposed of outside the town; and tar and liquor only produced the same price per ton as in the previous year. Residual products brought in a net revenue of £1298, as compared with £1374 in the previous year. With the increase in the price of coal and ammonia compounds, some improvement in the prices of residuals may be looked for in the current year. They would, however, have less coke to dispose of, owing to the different class of coal purchased. The total number of accounts on the books was 5060, as compared with 4412 at May 15, 1898. The number of prepayment meters had increased from 500 to 832; and 33 gas-engines and 374 gas-cookers were in use, including 192 cookers given free of hire to penny-in-the-slot

S. CLARK & CO.,

PATENTEES AND SOLE MANUFACTURERS OF

CLARK'S PATENT

"SYPHON" STOVES.



FOR USE WITHOUT A FLUE.

The "SYPHON" STOVE gives a *pure, equable,* and *agreeable* heat, which can be *graduated* or *sustained* at the will of the user.

The only safe Stoves for—
CONSERVATORIES.
BEDROOMS.
SICK CHAMBERS.
HOSPITAL WARDS.
WORKROOMS.
CHAPELS, &c.

Especially suitable for—
HALLS.
OFFICES.
SITTING-ROOMS.
SHOPS.
SCHOOLROOMS.
THEATRES, &c.

WRITE FOR NEW SEASON'S CATALOGUE.

S. CLARK & CO., Syphon Works, PARK ST., ISLINGTON, LONDON, N.

consumers. At May 15, 1898, the figures were 29 gas-engines and 265 gas-cookers, including 132 cookers for prepayment consumers. Coal contracts had been entered into at an average of about 1s. 9½d. per ton in advance of the price for the past year; and there had been a corresponding increase in all materials purchased under annual contract. As stated last week, the Gas Committee recommended an increase in the price of gas by 3d. per 1000 cubic feet; making the price to ordinary consumers 3s. 9d., and to consumers under the differential rate (of whom there are 323) 3s. 2d. The increased cost of coal will, it is estimated, amount to £1029. Provost Scobie moved that the recommendation of the Committee be adopted. It was unfortunate, he thought, that they should have to raise the price of gas; but it was being done in other towns also, and they must admit that it was a certain indication of prosperity in the general community. They had found that they were wrong in taking a penny off last year. The Commissioners adopted the Committee's recommendation. From another report, I learn that the gross profits for the past year were estimated at £6421, but only amounted to £5217; and that the interest on loans, contributions to sinking fund, and the like, amount to £5493. So that there is a deficit on the year's working of £276. The Commissioners have now had the gas undertaking in their hands for three years. Their gross profits were: In the first year, £5321; in the second year, £6133; and last year, £5217. The income for the past year showed an increase upon the preceding year of £234; but the expenditure was also greater by £1150. In the estimate for the current year, the expenditure is put down at £9226, and the income at £14,986—leaving a gross profit of £5760. If this should be realized, there will be a surplus. If it be asked how it is that Dunfermline has not done better than it has, there is one answer which can be given, which nearly covers the whole ground—the railway service is probably the worst in all Scotland.

The Bothwell and Uddingston Gas Company, Limited, was the first to be threatened with extermination by Mr. Samson Fox's water gas enterprise, but it has outlived the "reign of terror," and is now stronger than ever. During the past year, the output of gas was 37,282,000 cubic feet, an increase of nearly 5,000,000 cubic feet upon the previous year; and the loss from leakage was only 6·3 per cent., which is a marvellously low figure, when it is considered that the ground underfoot is riddled with coal workings. During the year there was a capital expenditure of £2500 upon the erection of a house for the Manager, and in alterations and extensions upon the works. The balance at the credit of the profit and loss account was £2466. Adding a sum of £841 brought forward from the previous year, and writing off £442 for depreciation, there is a net balance of £2739, out of which a dividend is to be paid at the rate of 10 per cent., absorbing £939, and the balance (£1800) is to be carried forward. Mr. L. Hislop, the Manager, is in a happy position.

The Stonehouse Gas Company held their annual meeting on Wednesday. Owing to the rise in the price of coal, it has been found necessary to advance the price of gas, as from July 1, from 4s. 2d. to 4s. 7d. per 1000 cubic feet.

A fatality from gas poisoning is reported from Glasgow, but not in a gas-works. On the afternoon of Saturday last, an elderly man named John Moore went on duty in the works of the United Alkali Company in Springburn Road. Shortly afterwards his son went to see him, and found him lying in an unconscious state under a platform in a purifying shed. There was a strong smell of gas in the place. Medical assistance was sent for; but the unfortunate man was dead before it arrived. It is supposed that Moore had intended to turn on a water-tap, but had opened a gas-valve instead, and been overcome before he could manage to escape.

The Largs Gaslight Company have declared a dividend of 6 per cent. for the past year.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *June* 17.

Sulphate of Ammonia.—There has again been a quiet market, though towards the close there is more inquiry. The closing quotations are £12 7s. 6d. to £12 10s. per ton, f.o.b. at the ports. Operators are postponing the covering of any requirements they have as long as possible. Meantime consumers are picking up any parcels offering at the reduced prices. There is rather more interest in the forward position; but the firmness of makers hinders business. London quotation for July-December delivery is £12 5s. per ton, Beckton terms.

Nitrate of Soda is quiet at 7s. 10½d. to 8s. per cwt., for good to fine quality, on spot.

LONDON, *June* 17.

Tar Products.—There is no very urgent demand for benzols for prompt delivery, nor is there any improvement in price; but the inquiries for the latter half of this year and the first half of next are more frequent, and seem to point to higher values later on. Gas companies are utilizing benzol for enriching purposes both here and on the Continent to a much more liberal extent than hitherto; and this, together with the falling off of naphtha from many sources where it can be disposed of as profitably in the form of creosote, lends considerable probability to the expectation of better values. Some slight improvement has taken place in solvent; considerable business having been done at 11½d. to 1s. Pitch has further improved; and although shipping is almost at a standstill on account of the weather, prices both for prompt and forward delivery are firm and improving. Creosote, carbolic, pyridine, and other tar products are fairly steady at recent prices.

Average prices are: Tar, 15s. to 23s. 6d. Pitch, east coast, 27s. 6d.; west coast, 24s. 6d. Benzols, 90's, 6½d.; 50's, 7½d. Toluol, 8½d. Solvent naphtha, 11½d. Heavy naphtha, 11d. Crude, 30 per cent., naphtha, 3d. Creosote, 3⅜d. Heavy oils, 62s. 6d. Carbolic acid, 60's, 2s. 1d.; 75's, 2s. 8d. Creosote salts, 45s. Anthracene, nominal, "A," 3½d.; "B," 2¼d.

Sulphate of Ammonia improved rapidly, and touched as high as £13, but had a set-back in the middle of last week to £12 2s. 6d., standing at present about £12 5s., less 3½ per cent. Business for a considerable period ahead could be done to-day at £12.

R. & A. MAIN, Ltd.

Argyle Works, GLASGOW.
Telegrams: "GASMAIN, GLASGOW."

214-226, St. John Street, Clerkenwell Green, LONDON, E.C.
Telegrams: "GASMAIN, LONDON."

BRISTOL: 28, BATH STREET. Telegraphic Address: "GOTHIC."
BIRMINGHAM: 1, OOZELLS STREET. Telegraphic Address: "GOTHIC."
MANCHESTER: 87, BLACKFRIARS STREET. Telegraphic Address: "GOTHIC."

OUR LATEST AWARD
PRIX D'HONNEUR
COOKERY AND FOOD EXHIBITION,
Imperial Institute, LONDON,
MARCH, 1899.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—In the coal trade of this district, there is no material change from last week, except that representatives of collieries in Lancashire report a considerable number of inquiries for gas coal coming in from districts to which it has not been usual to send supplies, and which is naturally taken to indicate there is a scarcity of gas-making coals in other mining centres. For any new business that is now entertained, there is a decided further hardening in prices; and 9s. 6d. to 10s. per ton at the pit would represent about the minimum figure at which ordinary descriptions of gas coal could now be bought. With regard to the general trade, there is necessarily a continued falling off in house-fire requirements for the better qualities of round coal; but any surplus output is more than required to provide the stock usually put down at this time of the year for the ensuing winter's demand. Pits consequently are generally kept on full time, with prices firm at 12s. to 12s. 6d. per ton for best Wigan Arley, 10s. 6d. to 11s. for Pemberton four-feet and seconds Arley, and 9s. 6d. to 10s. for common house coal. There is a probability not only that full list rates will be maintained during the summer, but that with the commencement of the autumn there will be a further advance. Steam and forge coals are in brisk request; and prices show a hardening tendency—9s. to 9s. 6d. per ton at the pit being quoted for good qualities. Engine fuel is also in active demand; and although some of the inferior sorts are less plentiful, the better qualities are still scarce. Best slack realizes 6s. 6d. to 6s. 9d. per ton, medium 5s. 9d. to 6s., and common 5s. to 5s. 6d. Shipping is fairly active, but prices show no material improvement; common steam coals being obtainable at 9s. 3d. to 9s. 6d. per ton delivered at the Garston Docks, 9s. 9d. to 10s. at the High Level, Liverpool, and about 10s. 6d. at the Partington tips of the Manchester Ship Canal.

Northern Coal Trade.—There has been a larger demand for several kinds of coal. Best Northumbrian steam coals are very firm at from 12s. 3d. to 12s. 6d. per ton f.o.b., second-class steam are about 11s. 6d., and steam smalls 5s. 6d. Manufacturing coals are firm, and the prices are well maintained; the consumption being rather heavy. The gas coal trade does not show the diminution in the working which is often seen at this time of the year; for the exports are steadily maintained, though the home demand is now at its smallest. Prices of gas coals vary greatly. Some of the large producers ask 10s. per ton f.o.b.; and it is quite likely that such a price may have to be paid when an increased demand sets in for additional cargoes in the home trade. In other cases, occasional cargoes of good gas coals are to be had at 3d. to 6d. per ton less than the figure stated; and it is well known that many of the contracts that are running are at lower prices. Gas coke is unchanged this week.

Scotch Coal Trade.—There is still an appearance of languishing about the trade; but there is a suspicion that this is deceptive, because by the end of next month the masters and men must come to an arrangement as to the future wages to be paid to the miners, and naturally the masters do not want a very prosperous state of matters to be recorded. There is said to be a disposition on the part of buyers to contract forward, which is not, however, met by sellers. Prices are therefore much the same; the quotations being: Main 8s. 9d. to 9s. per ton f.o.b. Glasgow, ell 9s. 6d. to 10s. 3d., and splint 9s. 6d. to 9s. 9d. The shipments for the week amounted to 175,502 tons—an increase of 14,918 tons upon the previous week, but a decrease of 25,413 tons upon the corresponding week of last year. For the year to date, the total shipments have been 3,556,523 tons—a decrease of 276,613 tons upon the same period of last year.

Crediton District Council and the Gas-Works.—Considerable discussion has recently taken place between the Crediton Urban District Council and the Gas Company respecting the public lighting and other matters; and, with a view to a more satisfactory arrangement, the Water and Lighting Committee recommend the Council to purchase the gas undertaking. The proposal came before the Council on Tuesday last. Mr. H. Churcher moved, as an amendment, that the question be deferred for six months. The Chairman (Mr. J. Mortimer) said he thought it would be a mistake to buy gas-works when in the future they might have the electric light. Only two members voted for the amendment; and the motion having been carried, the Clerk was instructed to ask the Company if they were willing to sell the works, and, if so, at what price.

Tonbridge Water Company.—At the recent general meeting of this Company, the accounts presented for the year ending March 31 last showed a disposable balance of £1022; and the Directors recommended a dividend for the half year of 4s. 6d. per share on the ordinary shares, and of 3s. 2d. per share on the additional shares; making 9s. per share (9 per cent.) for the year on the former, and 6s. 4d. per share (6¼ per cent.) on the latter. They reported a satisfactory increase in the revenue, and anticipated further important developments in the near future. During the year 119½ million gallons of water were delivered to the district of supply, and 6 million gallons to Southborough; giving a daily output of 350,000 gallons. The report and accounts were adopted; and a hearty vote of thanks was tendered to the Directors and to the Secretary and Manager (Mr. J. Lees) for the assiduous attention they had given to the work of the Company during the year.

Machine Stoking v. Hand Labour at the Longton Gas-Works.—In view of the statements contained in the report of the Special Committee appointed to investigate the management of the Longton Corporation Gas-Works (*ante*, p. 1311), in fairness to Mr. M'Gregor, the former Engineer and Secretary, we publish the following figures, which he sent last Friday to the local papers. He says they are interesting, as showing the results obtained by machinery as compared with hand labour, now that the former is being worked as it should be: Week ending June 15, 1898—Stokers' wages, at 4s. 9d. per day, £21 0s. 10d.; gas made, 1,476,000 cubic feet; cost per 1000 cubic feet, 3·42d.; illuminating power, 15·40 candles. Week ending June 15, 1899—Stokers' wages, at 5s. 3d. per day, £13 4s. 9d.; gas made, 1,398,000 cubic feet; cost per 1000 cubic feet, 2·27d.; illuminating power, 16·04 candles. Mr. M'Gregor adds: "These facts speak for themselves, more especially as the decrease in wages last week was over £7."

LATEST DEVELOPMENT
IN
GAS-COOKERS

WRIGHT'S PATENT,
BY WHICH ALL THE
ADVANTAGES OF LOOSE BURNERS
ARE OBTAINED
WITHOUT
ANY OF THE DISADVANTAGES.

NO EXTRA CHARGE IS MADE
FOR THESE IMPROVEMENTS.

JOHN WRIGHT & CO.
LIMITED,
LONDON & BIRMINGHAM.

Bude and Stratton Water Supply.—It has been decided by the Stratton Rural District Council to apply to the Local Government Board for power to borrow £8000 for the purpose of a water supply for Bude and Stratton. The source of supply is to be the reservoir of the Bude Canal—an undertaking which is to be acquired by the District Council.

Brixham Water Supply.—The Water Committee of the Brixham District Council, who have for a long time been considering proposals for augmenting the water supply of the town, reported last Wednesday that a scheme had been prepared by Mr. Codrington, which they considered practicable. It was estimated that it would cost £7500. The Chairman (Mr. W. J. Sanders) said they were convinced that it was impossible to supply the wants of the town by gravitation. Mr. Codrington proposed to utilize the springs on the low level, and pump the water to a reservoir on the high level. The report was adopted.

The Water-Works at Los Angeles.—The value of the water-works of Los Angeles (Cal.), or, more strictly, the value of improvements made by the Los Angeles City Water Company during thirty years to a small plant owned by the Municipality, has been fixed by arbitration at $1,183,591. The Arbitrators were Colonel G. H. Mendell, Jas. C. Kays, and Chas. T. Healey, but the latter dissented from the award on the ground that it was too low. The valuation was $995,389, after deducting depreciation and adding interest and contractors' profits. According to the "Engineer," the Arbitrators have allowed nearly $60,000 on account of the earning value of the plant. The latter sum the Company declare is so absurdly low as to warrant taking the matter into the Courts. The conditions are unusual, since the city originally owned the works and the water-rights, and was to pay the Company for the value of improvements at the end of thirty years. When the term expired, the city proposed to take possession of the works, on the ground that the Company were its tenants; but the Courts have held that the agreement was a contract, and not a lease.

The following exhibitions of gas appliances have lately been held: By Messrs. Fletcher, Russell, and Co., Limited, at Canterbury, with demonstrations by Miss H. Edden, and in Edinburgh, with lectures by Mrs. H. M. Young. By Messrs. R. & A. Main, Limited, at Dundee and Cupar Fife, with Miss Griggs and Miss Young as lecturers. By Messrs. Richmond and Co., Limited, in Edinburgh, with lectures by Miss Lillie Richmond. By Messrs. John Wright and Co., Limited, at Bury, with lectures by Miss Nellie Parker.

In the annual report of Messrs. F. Butzke and Co., of Berlin, for the year ended in December last, the Directors announce that the trading results have not answered expectations, owing to the losses incurred on the section of the business which includes the manufacture of gas cooking and heating apparatus; the surplus of expenditure over receipts in this department amounting to 186,022 marks. On the other hand, what had proved to be one of the remunerative branches of the undertaking was that for the manufacture and sale of apparatus for the production of acetylene gas, in which the Company have acquired a number of good patents. Checking a more speedy development, however, of this particular portion of the enterprise was the continued scarcity of calcium carbide during the illuminating season. This article could only be expected to gradually become more plentiful as the new carbide works now in course of construction were started. The incandescent light part of the undertaking had been made over to a new Company, in which the parent Company still retained an interest. This new flotation remained to be developed. So far the amount of business done by the Company in these self-lighting incandescent bodies had not realized the hopes which had been formed; and during the year this branch also had yielded no profit, The net profit upon the whole of the Company's business amounted to 15,140 marks, which, with the balance from the previous year, left, after deduction of the statutory amount placed to the reserve fund, a sum of 21,218 marks, to be devoted to the depreciation account.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications re Oxide to the Company as above.

WINKLEMANN'S ORIGINAL "VOLCANIC" FIRE CEMENT and "VOLCUM" PASTE. Always ready for use in GAS-WORKS. Resists 4500° Fahr.

ANDREW STEPHENSON,
182, Palmerston Buildings,
Old Broad Street, E.C.
"Volcanism, London."

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS.
Correspondence invited.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."
[For Illustrated Advertisement, see June 6, p. 1518.]

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., Ammonia Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

SPENT OXIDE wanted.
BROTHERTON AND CO., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

IRON OXIDE (Bog Ore), best quality, for the Purification of Gas, containing up to 85 per cent. Hydrated Oxide of Iron, and absorbing while being used a high percentage of Blue.
S. BOWLEY AND SON, Wellington Works, Battersea Bridge, LONDON, S.W.

SULPHURIC ACID for Sale.
BROTHERTON AND CO., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM; and 45 & 47, Westminster Bridge Road, LONDON, S.E.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

TO GAS AND WATER OFFICIALS.

CYCLES of the Highest Quality at reasonable Prices. Catalogue, post free. For CASH, or on GRADUAL PAYMENT SYSTEM. *Sent on approval. Twelve Months' Guarantee.*
MELROSE CYCLE COMPANY, COVENTRY.

SPECIAL PAINT FOR GAS-WORKS.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1769.

PATENTS FOR INVENTIONS.
Messrs. J. C. CHAPMAN & CO., Chartered Patent Agents, ADVISE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the BRIMINGTON CARBON COMPANY, Scwerby Bridge, YORKS.

IMPORTANT.

REPAIR your old Retorts with Patent STICKFAST FIRE CEMENT. Unequalled for Repairing Inclines. Estimates for all kinds of Retort-Settings.
Write CROWTHER, Retort Setter, and Sole Maker of Stickfast Fire Cement, Manor Street, HUDDERSFIELD.

GAS TAR wanted.
BROTHERTON AND CO., Tar Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SHEFFIELD CHEMICAL COMPANY, LIMITED, BUYERS of Spent Oxide. Sellers of OXIDE OF IRON and SULPHURIC ACID.

PRACTICAL RETORT SETTER.

GEORGE NUTTALL, 32, Havelock Road, Saltley, Birmingham.
Regenerator or other Furnaces erected to Engineers' own Designs. Best Work Guaranteed. Please write for Estimates.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE BOLTON. Special attention to Repairs.
Before placing Orders, please write for Estimate.
Telegraphic Address: "SATURATORS, BOLTON."

SEASON 1899.

BALE'S OXIDE OF IRON, of finest Quality. Summer delivery specially recommended for efficiency and economy.
FIRE CEMENT, PAINT, and CHEMICALS.
120 and 121, NEWGATE STREET, LONDON, E.C.

SADLER & CO., Ltd., Middlesbrough, Tar Distillers and Tar Colour Manufacturers. BENZOL specially prepared for Gas Enrichment free from Sulphur. Pure Hydrated OXIDE OF IRON for Purifying Gas either for Sale or Lent on Hire. Always Buyers of GAS TAR and AMMONIACAL LIQUOR.

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

BENZOL, specially made for the Enrichment of Gas.
ELLISON AND MITCHELL, LIMITED, Kilnhurst, near ROTHERHAM.

ADVERTISER desires Situation as FITTER. Well up in Iron and Compo., Cookers, Fires, Main and Service Laying, and Meter Taking. Home or Foreign Appointment. Good Testimonials.
Address No. 3288, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SITUATION required by Gas-Works ASSISTANT who holds First-class Certificate for Gas Manufacture, and has good knowledge of Chemistry and Drawing. Nominal Salary to gain further experience.
Address No. 3283, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a permanent Situation as WORKING MANAGER or FITTER in a Gas-Works. Twenty Years' practical Experience in the Manufacture and Distribution of Coal Gas, Mains, Services, Meters, Iron and Compo. Pipe, including Mechan cal Repairs on Works. Good References.
Address J. FRENCH, Gas-Works, Kelvedon, ESSEX.

WANTED, a Young Man, well acquainted with the Gas and Electric Business. Must understand German, and be thoroughly experienced in everything relating to English Trading in the lines mentioned. Favourable Terms.
Address detailed applications to E. HECKMANN & Co., BERLIN, Seydel-Strasse 3.

CITY OF CARLISLE.

GELTSDALE GRAVITATION WATER SCHEME.
DRAUGHTSMAN.

WANTED, immediately, a first-class DRAUGHTSMAN accustomed to Water-Works construction.
Apply to the undersigned not later than the 27th inst., stating Age, Experience, and Salary required.
C. B. NEWTON,
Engineer.
Water-Works, Carlisle,
June 10, 1899.

METER Inspector wanted for a Provincial Gas Company. Also two good SERVICE LAYERS.
Apply, by letter, to No. 3291, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED at once, a first-class Draughtsman, well up in Designing and Estimating Gasholders and Modern Gas Plant of all descriptions.
Address, with *copies* of recent Testimonials, stating Age, Salary required, &c., C. & W. WALKER, LIMITED, Donnington, near Newport, SHROPSHIRE.

WANTED, by a Gas Company near London, a steady reliable Man as LEADING STOKER. Wages average 35s. per week. A constant job to a willing Man.
Apply, by letter, with Character, and state when disengaged, to No. 3290, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Manager for the Carnforth Gas and Water Companies. He must have a thoroughly practical knowledge of his duties, and be able to keep the Books and fill the position of Secretary. Salary £200 a year with House.
Apply, with References, both as to ability and character, to the Chairman, E. BARTON, Esq., CARNFORTH.

WANTED, at once, an active and trustworthy Young Man as COLLECTOR. Applicants must have held a similar position under Gas or Water Company, write a good hand, be correct at figures, and competent to read Gas or Water Meters. Salary to commence, 25s. per week. Security for £200 will be required through a Guarantee Society.
Applications, with recent Testimonials, to be forwarded to Mr. F. RUSSELL, Manager, Gas-Works, BEXHILL.

HEXHAM GAS COMPANY.

WORKING Foreman Wanted. Must be a good Carbonizer, and Main and Service Layer. Wages, 30s. per week, with House free.
Applications, with not more than three recent Testimonials, to be forwarded to the undersigned, not later than the 30th inst.

HERBERT LEES,
Engineer and Secretary.

Gas-Works, Hexham,
June 14, 1899.

SHEFFIELD UNITED GASLIGHT COMPANY.

GAS ENGINEER.

THE Directors of the above Company require the services of an experienced practical ENGINEER.
Applicants must have a thorough knowledge of the Manufacture, Purification, and Distribution of Gas; have had experience of Stoking Machinery and Regenerative Firing; be able to prepare Plans and construct New Works; also understand the Making of Sulphuric Acid and Sulphate of Ammonia, and the erection of Plant in connection therewith.
The successful Candidate will be required to devote the whole of his time to the duties of the Office.
Applications, marked "Engineer," stating Qualifications, Age, if Married, and Salary required, to be delivered not later than Thursday, July 6, addressed to Sir Fredk. T. Mappin, Bart., M.P., the Chairman of the Company.
Testimonials not to be sent in the first instance, nor till asked for.

By order,
HANBURY THOMAS,
General Manager and Secretary.

Gas Company's Offices, Commercial Street,
Sheffield, June 12, 1899.

FOR SALE, cheap—
Two PURIFIERS, 8 ft. square by 4 ft. deep.
Two " 5 ft. " 4 ft. "
One " 5 ft. " 3 ft. "
One EXHAUSTER, 20,000 Cubic Feet per hour.
Two " 5000 " " "
Also CONDENSERS, SCRUBBERS, WASHERS, GASHOLDERS and TANKS, VALVES, &c., &c.
Apply to SAML. WHILE AND SON, 60, Queen Victoria Street, LONDON, E.C.

FOR SALE.

THE Directors of the Staines and Egham Gas Company have FOR SALE a 10-inch HORIZONTAL CONDENSER, a LIVESEY WASHER, and a GOOD'S WASHER—the whole complete, with 10-inch Connections, Valves, &c. They are capable of dealing with 500,000 cubic feet of Gas in 24 hours. All in good condition, and can be removed at once. The whole to be taken down and carted from the Company's Works by the Purchaser.
Tenders for the whole as they stand to be sent to the undersigned.

THOMAS WEBB,
Manager.

GAS Plant for Sale. No reasonable offer refused:—
HYDRAULIC MAINS, MOUTHPIECES, &c. (Self Sealers). Also
Four Wrought Iron Annular Condensers.
Six-inch PIPE CONDENSERS.
TOWER SCRUBBER, 3 ft. by 12 ft., Tank Tippler, &c., complete.
TOWER SCRUBBER, 6 ft. 6 in. by 12 ft., complete.
TOWER SCRUBBER, 5 ft. by 25 ft., or 40 ft., complete.
ENGINES and EXHAUSTERS, 5000 to 30,000 feet per hour.
PURIFIERS, Several sizes and sets complete.
STATION METER, 9000 cubic feet per hour complete.
Six-inch STATION GOVERNOR, complete.
GASHOLDERS, one 35 ft. by 14 ft. counterbalanced. Six Years.
All guaranteed good order and condition.
J. FIRTH BLAKELEY & Co., Thornhill, DEWSBURY.

FOR SALE, in good condition (replaced by larger)—Set of Three PURIFIERS, each 6 feet square, with 6-inch Centre-Valve, Connections, Traveller, &c., all complete. One GASHOLDER, 30 feet diameter, 12 feet high, with Guide-Framing, 6-inch Connections, &c.
Address N. H. HUMPHRYS, Gas Engineer, SALISBURY.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

THE Wolverhampton Gas Company have FOR SALE, at their Horsley Fields Works, the following SECOND-HAND PLANT comprising: Retort-Fittings, Two Exhausters, Two Steam-Engines, Two Boilers, Two Sets of Vertical Cast-Iron Condensers, Two Scrubbers about 25 ft. by 7 ft., Station Meter, Governor, Cast-Iron Tanks, Weighing-Machine, Roof Principals, &c.
The above can be seen by appointment.
For further Particulars apply to the MANAGER, Gas Company, WOLVERHAMPTON.

FOR SALE—One Station Meter, by J. & J. Braddock, complete with 6-inch Valves and Bye-Pass, quite equal to new.
One GOVERNOR, with 7-inch Inlet and Outlet Pipes, and Bye-Pass. Also by Braddock.
One Patent CENTRE-VALVE, with 6-inch Connections, by C. & W. Walker.
20 Cast-Iron RETORT MOUTHPIECES, oval, 21 in. by 15 in., fitted with Lids, Screws, and Cross-Bars.
A quantity of 6-inch and 8-inch VALVES.
Apply to H. I. WILLIAMS & Co., Kidsgrove, STAFFORDSHIRE.

THE Holywood Gas Company, Limited (Co. Down), invite TENDERS for supplying and fixing one 8-inch Dry-faced CENTRE-VALVE, to work four Purifiers.
Tenders to include all Connections and fitting to existing Purifiers.
The Directors do not bind themselves to accept the lowest or any Tender.
Particulars from the MANAGER.

EDINBURGH AND LEITH CORPORATIONS' GAS COMMISSIONERS.

GASHOLDER AND FRAMING.

THE Commissioners are prepared to receive TENDERS from Structural Engineers, for the construction of a FOUR-LIFT TELESCOPIC GASHOLDER, 250 feet in diameter by 189 feet deep, together with External Guide-Framing, &c., &c., complete.
Specifications and Form of Tender, together with a set of copies of eleven Detailed Drawings, can be obtained on application to the Chief Engineer, Mr. W. R. Herring, Gas-Works, Edinburgh, upon the deposit of £10, which sum will be returned on receipt of a *bonâ-fide* Tender, and the return of the Drawings and Specification.
Tenders upon the Form provided, undetached from the Specification, are to be delivered to the undersigned on or before the 22nd day of July next, endorsed "Tender for Gasholder."
Drawings to be returned to the Engineer on or before the 20th day of July.
The Commissioners do not bind themselves to accept the lowest or any offer.

By order,
JAMES M'G. JACK,
Clerk.

25, Waterloo Place, Edinburgh,
June 9, 1899.

GOOLE URBAN DISTRICT COUNCIL.

(GAS AND WATER COMMITTEE.)

TENDERS FOR GAS COAL.
TENDERS FOR STEAM COAL.
TENDERS FOR TAR.

COAL.

THE above Council are prepared to receive TENDERS for the supply of from:—
5000 to 6000 Tons of Best Screened, Unscreened, Cobbles, Nuts or Screened Slack GAS COAL
600 to 700 Tons of Best Screened STEAM COAL
in such quantities as the Council may direct from time to time for One Year from date of Contract.
The Gas Coal to be delivered free at the Lancashire and Yorkshire Siding in Bridge Street, the North-Eastern Railway Station, or by Boat on the Wharf of the Aire and Calder Canal at Goole, or the River Don alongside the Gas-Works.
The Steam Coal to be delivered alongside the Rawcliffe Pumping-Station (near Goole) on the Aire and Calder Canal.
Tenders to state the Price per Ton of 20 cwt., weighed on delivery as per Clause No. 4, General Conditions.

TAR.

Tenders for the surplus TAR made during the year from July 1, 1899, the same to be made at a fixed price per ton (of 20 cwt.), delivered into Boat on the River Don alongside the Gas-Works, or into Tank-Trucks at the Lancashire and Yorkshire or North-Eastern Railway Sidings at Goole.
Tenders, endorsed and sealed, to reach George England, Clerk to the Council, Exchange Buildings, Goole, before the 24th day of June next.
The Council do not bind themselves to accept any Tender.
Further Information and Form of Tender may be had *(on written application only)* from the undersigned.

By order of the Committee,
MATT. DUNN, M.Inst.Mech.E.,
Engineer and Manager.

Engineers' Office,
Gas-Works, Goole,
May 31, 1899.

RADCLIFFE & PILKINGTON GAS COMPANY.

TENDERS FOR COAL AND CANNEL.

THE Directors of the Radcliffe and Pilkington Gas Company invite TENDERS for about 12,000 Tons of GAS COAL and CANNEL.
Particulars may be obtained from the undersigned to whom Tenders, properly endorsed, must be delivered on or before Friday, the 30th of June.

JAMES BRADDOCK,
Manager and Secretary.

Gas Offices, Radcliffe,
June 12, 1899.

CHEPSTOW GAS COMPANY LTD.

TENDERS FOR COAL.

THE Directors of the above Company invite TENDERS for the supply of 1200 to 1400 Tons of best large GAS COAL, COBBLES, or NUTS for One Year.
Tenders to state the name of Coal offered, and the price per ton delivered free at Chepstow Station.
The Directors reserve to themselves the right to accept the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any Tender.
Tenders, addressed to H. Gillam, Chairman, and endorsed "Tender for Coal," to be delivered at the Office of the Company on or before the 26th of June, 1899.

By order,
J. L. RUST,
Manager.

Gas-Works, Chepstow,
June 14, 1899.

BOROUGH OF BEVERLEY.

TENDERS FOR COAL.

THE Gas Committee are desirous to receive TENDERS for the supply of COAL for a period of Twelve Months from the 1st of October next, to be delivered as from time to time directed by, and at the expense of, the Contractors f.o.b. at Keadby, or at the Pits, or at the Railway Station, Beverley, according to the terms of Contract. The Coal to be of the Best Kind, well Screened, free from Sulphur, Bats, Bind, Refuse, and Dirt, and to be weighed (21 cwt. to the Ton) upon the Corporation Machine. Payments will be made monthly so long as the Contract shall be duly fulfilled.
The Corporation do not bind themselves to accept the lowest or any Tender.
Further Information may be obtained of the Gas Manager, Mr. James Gibson, at the Gas-Works, Beverley; and Tenders, endorsed "Tenders for Coal," must be delivered at my Office not later than Wednesday, the 28th of June, 1899.

By order,
J. WILLIS MILLS,
Town Clerk.

Guildhall, Beverley,
June 13, 1899.

CARDIFF GASLIGHT AND COKE COMPANY.

TENDERS FOR COALS.

THE Directors of the above Company are prepared to receive TENDERS for a supply of 79,000 Tons of Best Well-Screened large GAS COALS, to be delivered between August, 1899, and the 30th of June, 1900, in monthly quantities in accordance with the Specification.
Parties tendering may do so for the whole quantity, or for quantities of from 5000 Tons upwards.
Forms of Tender and Specification of monthly deliveries may be obtained on application to the Engineer and Manager, Mr. H. Morley, M.Inst.C.E.
Sealed Tenders to be sent to the undersigned not later than Ten a.m. Thursday, the 6th day of July next, addressed to the Chairman of the Company, endorsed "Tender for Coal."
The Directors do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right to apportion the whole quantity as they may think fit.

By order,
GEORGE CLARRY,
Secretary.

Gas Offices, Cardiff,
May 31, 1899.

CITY OF NOTTINGHAM.

(WATER DEPARTMENT.)

TENDERS FOR THE SUPPLY OF VALVES AND HYDRANTS, PIPES, LEAD, COAL, TAPS, AND FITTINGS.

THE Water Committee of the Corporation are prepared to receive TENDERS from competent Ironfounders, Brassfounders, Valve Manufacturers, Lead Merchants, and Colliery Proprietors and Coal Merchants for the supply of the undermentioned goods for the ensuing Year:—
1.—CAST-IRON DOUBLE-FACED SLUICE VALVES and HYDRANTS.
2.—CAST-IRON MAIN PIPES.
CAST-IRON SPECIAL PIPES.
3.—LEAD PIPING.
LEAD INGOTS.
4.—GUN METAL TAPS & FERRULE FITTINGS
5.—STEAM COAL and OTHER FUEL.
Specifications and Drawings, together with Samples Weights, &c., may be seen, and other Information obtained, at the Office of the Water Manager, Mr. Stephen Moore, St. Peter's Church Side; and Forms of Tender may be obtained at that Office on payment of One Guinea, which sum will be returned on receipt of a *bonâ-fide* Tender.
Tenders, endorsed "Tender for Valves," "Tender for Pipes," "Tender for Lead," "Tender for Taps," or "Tender for Coal," to be delivered to me at the Guildhall, Nottingham, on or before the 1st day of July next.
The Committee do not bind themselves to accept the lowest or any Tender.

By order of the Water Committee
SAMUEL G. JOHNSON,
Town Clerk.

Guildhall, Nottingham, June 13, 1899.

ISLE OF THANET GASLIGHT AND COKE COMPANY, MARGATE.

TENDERS FOR 18-INCH MAIN AND SPECIALS.

THE Directors of the Isle of Thanet Gaslight and Coke Company, invite TENDERS for the supply of 410 yards of 18-inch CAST-IRON GAS-MAIN, and SPECIAL CONNECTIONS.

Further Particulars may be had of the Engineer, Mr. James Dougall.

By order,
THOS. C. FULLER,
Secretary.

Offices: The Dane, Margate.

TENDERS FOR COAL.

THE Directors of the Holyhead and North Wales Gas and Water Corporation, Limited, are prepared to receive TENDERS for the supply and delivery of COALS to their various Works for the ensuing Year.

Full Particulars and Forms of Tender may be had on application to the undersigned, to whom sealed Tenders, endorsed "Tender for Coal," must be sent not later than Twelve noon, Thursday, July 6, 1899.

GEORGE E. SAVILLE,
Engineer and General Manager.

Conway Road, Penmaenmawr,
June 17, 1899.

RAMSBOTTOM GAS COMPANY.

GAS COAL.

THE Directors of the above Company invite TENDERS for the supply of 5000 Tons of GAS COAL, delivered at their Siding, Stubbings, near Ramsbottom, in such quantities as may be required from time to time for One Year from date of Contract.

Tenders, endorsed, to be sent to John Rothwell, Esq., Chairman, Gas-Works, Ramsbottom, not later than Saturday, July 1, 1899.

Further Information and Form of Tender may be had on application from

FRANK BARRETT,
Manager and Secretary.

CORPORATION OF EAST RETFORD GAS UNDERTAKING.

THE Gas Committee invite Tenders for the purchase of their surplus TAR and AMMONIACAL LIQUOR to be produced at their Works during the next Twelve Months ending June 30, 1900.

Sealed Tenders, endorsed "Tender for Residuals," to be sent in to the Chairman of the Gas Committee on or before July 1 next.

Further Particulars from the undersigned.

J. B. FENWICK,
Engineer and Manager.

Gas and Water Offices,
Retford, June 15, 1899.

SOUTH SHIELDS GAS COMPANY.

TO METER MANUFACTURERS.

THE Directors of the South Shields Gas Company invite TENDERS for the supply of DRY GAS-METERS required during the Year ending the 30th of June, 1900.

The Meters must be of the best quality, stamped, and delivered at the Gas-Works, carriage paid.

The Directors do not bind themselves to accept the lowest or any Tender.

Form of Contract and further Particulars may be had on application.

Sealed Tenders, marked "Tenders for Meters," to be delivered to the undersigned not later than Friday, the 30th of June next.

J. H. PENNEY,
Secretary.

Gas Offices: Chapter Row,
South Shields, June 16, 1899.

GUILDFORD GASLIGHT AND COKE COMPANY.

TO TAR DISTILLERS.

THE Directors of the above Company are prepared to receive TENDERS for the surplus COAL GAS TAR and CARBURETTED WATER GAS TAR, separately or mixed, produced by the above Company for the Year ending the 30th of June, 1900. Coal Carbonized, about 12,000 Tons per annum.

All Tenders to state the Price per Cask of 40 gallons.

Cartage to and from the Railway Station, Guildford, free.

All empties to be provided by the Contractor.

Tenders, endorsed "Tar," to be sent to David Williamson, Esq., J.P., Chairman of the Gas Company, Guildford, on or before June 28, 1899.

By order,
WILLIAM TITLEY,
Secretary.

Gas Offices, Guildford,
June 9, 1899.

CITY OF LEEDS.

(GAS DEPARTMENT.)

TENDERS FOR COAL AND CANNEL.

THE Gas Committee of the Leeds City Council are prepared to receive TENDERS for the supply of about 200,000 Tons of best GAS COALS (Screened or Nuts), and about 35,000 Tons of CANNEL.

Forms of Tender may be obtained on application to the undersigned.

Tenders may be for any portion of the total quantity required, and will be received not later than Monday, the 26th inst., addressed to the Chairman of the Gas Committee, Municipal Buildings, Calverley Street, and endorsed "Tender for Coal."

The Committee do not bind themselves to accept the lowest or any Tender.

R. H. TOWNSLEY,
General Manager.

Municipal Buildings, Calverley Street,
Leeds, June 10, 1899.

TENDERS FOR GAS COAL.

THE Gas Committee of Limerick are prepared to receive TENDERS for a supply of GAS COAL according to a Specification to be had on application at the Gas Offices, 34 and 35, William Street.

Limerick, June 10, 1899.

TENDERS FOR COAL.

THE Directors of the Cranleigh Gas and Coke Company, Limited, invite TENDERS for the supply of 500 Tons of good GAS COAL, to be delivered free at Cranleigh (L.B. & S.C. Railway) Station during the Year Aug. 1, 1899, to July 30, 1900, in lots of about 50 Tons, as ordered by the Secretary.

Tenders, endorsed "Coal," to be sent to me, on or before Monday, the 26th inst.

H. J. HAYMAN,
Secretary.

Gas-Works, Cranleigh, Surrey.

TENDERS FOR GAS COAL.

THE Directors of the Westerham Gas and Coke Company, Limited, invite TENDERS for the supply of about 500 Tons of screened GAS COAL, to be delivered to Westerham Station, in quantities of 50 Tons at the time to suit the convenience of the Directors' during the ensuing Year.

Tenders, endorsed "Tender for Coal," to be sent in by July 5.

The Directors do not bind themselves to accept the lowest or any Tender.

By order of the Directors,
CHAS. HOOKER,
Secretary and Manager.

Westerham.

COUNTY BOROUGH OF SALFORD.

(GAS DEPARTMENT.)

SPENT OXIDE.

THE Gas Committee invite Tenders for the purchase of about 445 Tons of SPENT OXIDE at their Regent Road and Bloom Street Works.

Full Particulars may be obtained on Application to the Gas Engineer, Gas Offices, Bloom Street, Salford.

Sealed Tenders, endorsed "Tenders for Spent Oxide," and addressed to the Chairman of the Gas Committee, Town Hall, Salford, to be delivered to me not later than Three p.m. on Thursday, the 29th of June, 1899.

By order,
L. C. EVANS,
Town Clerk (*pro tem.*).

Town Hall, Salford,
June 14, 1899.

SUTTON, SOUTHCOATES, AND DRYPOOL GAS COMPANY, HULL.

THE Directors of the above Company invite TENDERS for the surplus TAR and AMMONIACAL LIQUOR produced at their Works during the Twelve Months ending June 30, 1900.

Probable quantity of Tar. . . . . 900 Tons.
" " Ammoniacal Liquor 1100 Tons.

Tenders for Liquor must state price per Ton per degree Twaddel's Hydrometer, from 4° to 8°.

Tenders to be sent to the undersigned on or before the 26th of June, 1899, marked "Tender for Tar" or "Liquor."

The Directors do not bind themselves to accept the highest or any Tender.

DAVID WOOD,
Secretary.

Offices: St. Marks Street, Hull,
June 7, 1899.

CORPORATION OF LEICESTER.

IRON ROOFING.

THE Gas and Electric Lighting Committee are prepared to receive TENDERS for the supply and erection of one ROOF, about 212 ft. long and 50 ft. span, at their Aylestone Road Works.

Drawings may be seen, and Specification and Form of Tender obtained, upon application to the Engineer, and on payment of the sum of £5, which amount will be returned on receipt of a *bonâ-fide* Tender.

Tenders, addressed to Alderman Lennard, J.P., Chairman, and endorsed "Tender for Roof," to be delivered at these Offices not later than Eleven o'clock, a.m., on Saturday, the 24th of June next.

The Committee do not bind themselves to accept the lowest or any Tender.

ALFRED COLSON, M.Inst.C.E.,
Engineer and Manager.

Offices: Millstone Lane,
Leicester, June 14, 1899.

SEDGLEY URBAN DISTRICT COUNCIL.

COAL, GAS-MAINS, AND GAS-GOVERNOR.

TENDERS are requested for supplying the Sedgley Urban District Council with CAST-IRON SOCKET and SPIGOT GAS-MAINS, made for Lead Joints, and coated with Dr. Angus Smith's solution, delivered free at the Gas-Works, Lower Gornal, as follows—viz.,

471 yards 8 inches internal diameter.
249 " 6 " "
861 " 4 " "

The Makers must specify weight per yard.

For 8-inch GAS-GOVERNOR, with three 8-inch Bye-Pass Valves, delivered free at the Gas-Works.

For supplying 500 to 1000 Tons of GAS COAL, the deliveries to be made at Shut End Siding at such times and in such quantities as may be directed.

Separate and sealed Tenders, marked "Tender for ————," must reach me on or before the 6th of July next.

The Council do not bind themselves to accept the lowest or any Tender.

JOSH. SMITH,
Clerk.

Offices: High Holborn, Sedgley,
June 16, 1899.

STRATFORD-UPON-AVON CORPORATION.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for 4000 Tons of GAS COAL for delivery during the ensuing Twelve Months.

Forms of Tender and full Particulars can be obtained of the undersigned.

By order,
J. S. CRANMER,
Manager.

June 14, 1899.

GLOUCESTER GASLIGHT COMPANY.

TENDERS FOR GAS COAL.

THE Directors of the above Company invite TENDERS for the supply of about 25,000 Tons of GAS COAL for One Year from the 1st day of July next, in such monthly quantities as may be required by the Company.

Tenders to state the price delivered at the Midland Railway Wharf, High Orchard, or the Great Western Railway Wharf, Llanthony, Gloucester; or if sent (as preferred) by Water, the price f.o.b., and also the price delivered at the Gas Company's Wharf on the Gloucester and Berkeley Canal.

Further Particulars and Forms of Tender may be obtained of the Company's Engineer, Mr. R. Morland.

Sealed Tenders, endorsed "Tender for Coal," specifying the description and quality of the Coal, to be addressed to the Chairman, Gas Offices, Eastgate Street, Gloucester, and delivered not later than the 3rd day of July next.

The Directors reserve to themselves the right to accept the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any Tender.

By order,
WILLIAM E. VINSON,
Secretary.

Gas Offices, Gloucester
June 1, 1899.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.

LOWESTOFT WATER AND GAS COMPANY.

500 £10 (FULLY PAID) ADDITIONAL ORDINARY SHARES.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Wednesday, June 28, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

SOUTHEND GAS COMPANY.

£10,000 OF FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Wednesday, June 28, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.

SOUTHEND WATER-WORKS COMPANY

500 £10 SHARES.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Wednesday, June 28, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.

GUILDFORD GASLIGHT AND COKE COMPANY.

£5000 OF ORDINARY STOCK,

Ranking for a Standard Dividend of 5 per cent. per annum subject to the Sliding Scale; the Dividend on similar Stock in the Company having for several years past been at this rate, and paid free of Income-Tax.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION at the Mart, E.C., on Wednesday, July 5, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.

WATFORD GAS AND COKE COMPANY.

£3500 "C" CAPITAL STOCK,

Ranking for a Standard Dividend of 7 per cent. subject to the Sliding Scale, the last Dividend on the Company's "C" Capital Stock having been at the rate of 9 per cent. per annum.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Wednesday, July 5, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS of this Company so far as relate to the DEBENTURE STOCK WILL BE CLOSED on Thursday, the 15th inst., at Ten o'clock forenoon, and RE-OPENED on Saturday, the 24th inst.

The Interest for the Half Year to the 30th of June, 1899, will be payable on the 1st day of July next to the Proprietors registered on the closing of the Books.

By order,
JAMES RANDALL,
Secretary.

Offices of the Company:
Willoughby Lane, Tottenham,
June 8, 1899.

THE ACETYLENE ILLUMINATING CO., LTD.,
MANUFACTURERS OF CARBIDE OF CALCIUM,
63, QUEEN VICTORIA STREET, LONDON, E.C.,
and FOYERS, SCOTLAND.

(The Acetylene Illuminating Company, Limited, Incorporated in May, 1895, as a Private Development Company, was the First Undertaking established in Europe for the Manufacture of Carbide of Calcium.)

NOTICE.

THE Acetylene Illuminating Company, Limited, possesses an exclusive Licence for the United Kingdom to use for the manufacture of Carbide of Calcium for Light, Heat, and Power Purposes, the Inventions which are comprised in Mr. Willson's British Letters Patent. The Company is also similarly licensed under the British Letters Patent owned by the British Aluminium Company, Limited, so far as these relate to the manufacture of Carbide of Calcium for the same purposes.

The Patents have been submitted to Mr. Fletcher Moulton, Q.C., Mr. Roger Wallace, Q.C., and Mr. Arthur Colefax, who have given the following joint opinion:—

"In our opinion The Acetylene Illuminating Company, Limited, by their Patents control the process "by which alone Calcium Carbide can be commercially produced by electricity, and are also "entitled thereunder to prevent the importation into "this country of Calcium Carbide so produced."

The Acetylene Illuminating Company, Limited, are determined to permit of no Infringement of their Patent Rights, and have brought an Action against the Midland Acetylene (Parent) Syndicate, Limited, to restrain them from manufacturing Carbide of Calcium by means of the Electric Furnace. The Acetylene Illuminating Company intend in future to bring actions against all Infringers of their Patents, whether Manufacturers or Importers, and against all Purchasers of Carbide of Calcium made or imported in Infringement of their Patent Rights.

NOTICE.

THE Acetylene Illuminating Company, Limited, having published and issued an advertisement or circular claiming that they hold the British Patents for the Manufacture of Calcium Carbide by means of the Electric Furnace, we guarantee to indemnify anyone who buys Carbide from us against any claim by "The Acetylene Illuminating Company, Limited," or anyone else.

THE READ-HOLLIDAY ACETYLENE COMPANY, LIMITED, Acetylene Gas Engineers and Carbide of Calcium Manufacturers, HUDDERSFIELD.

NOTICE.

THE Acetylene Illuminating Company, Limited, having published and issued an advertisement or circular claiming that they hold the British Patents for the Manufacture of Calcium Carbide by means of the Electric Furnace, we guarantee to indemnify anyone who buys Carbide from us against any claim by "The Acetylene Illuminating Company, Limited," or anyone else.

TINKER AND HOLLIDAY, LIMITED, Carbide of Calcium Manufacturers, HAZELHEAD, SHEFFIELD.

Foolscap 4to, pp. 535, with 239 Illustrations and Steel Plate Engraving (as Frontispiece) of WILLIAM MURDOCH, *Inventor of Gas Lighting. Morocco Gilt, 21s.; Roan Gilt, 18s.*

THE SIXTH (AND CENTENARY) EDITION OF THE

HANDBOOK FOR GAS ENGINEERS AND MANAGERS.

BY

THOMAS NEWBIGGING,
M.Inst.C.E.

LONDON:
WALTER KING, 11, BOLT COURT,
FLEET STREET, E.C.

NITRATE of Thorium and Cerium.
FABRIK CHEMISCHER PRAEPARATE VON STHAMER, NOACK, AND CO., HAMBURG.

HOLMSIDE

GAS COALS.

Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . .	11,205 Cubic Feet.
Illuminating Power	16$\frac{7}{10}$ Stand. Sperm. Candl.
Coke (of good & pure quality)	13$\frac{3}{4}$ Cwt. per Ton.
Sulphur	A little over 1 per Cent.
Ash	Under 1 per Cent.
Tar	163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor	103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR

PELTON GAS COALS.

Present Daily Produce available 3000 Tons.

Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.

Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,
HOLMSIDE & SOUTH MOOR OFFICES,
NEWCASTLE-UPON-TYNE.

ENRICH YOUR GAS
WITH CHEAP
BENZOL,
SPECIALLY PREPARED, FREE FROM SULPHUR.

AT to-day's Price of Benzol, Illuminating POWER costs less than ONE-THIRD OF A PENNY PER CANDLE.

Apply to SADLER & CO., MIDDLESBROUGH.

JAMES OAKES & CO.

ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

LONDONDERRY GAS COALS

FROM THE

MARQUIS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

Available Output up to 5000 Tons per day.
Yield of Gas 11,000 cubic feet per Ton of Coal as per Analysis by
Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO

S. J. DITCHFIELD,
SEAHAM HARBOUR, COUNTY OF DURHAM.

THE SILICA FIRE-BRICK COMPANY,

OUGHTIBRIDGE, near SHEFFIELD,
MANUFACTURE]

SILICA BLOCKS, BRICKS, AND CEMENT

OF SUPERIOR QUALITY
FOR GAS-FURNACES.

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their
GREATER DURABILITY,
Strongly recommended where EXCESSIVE HEATS have to be maintained.

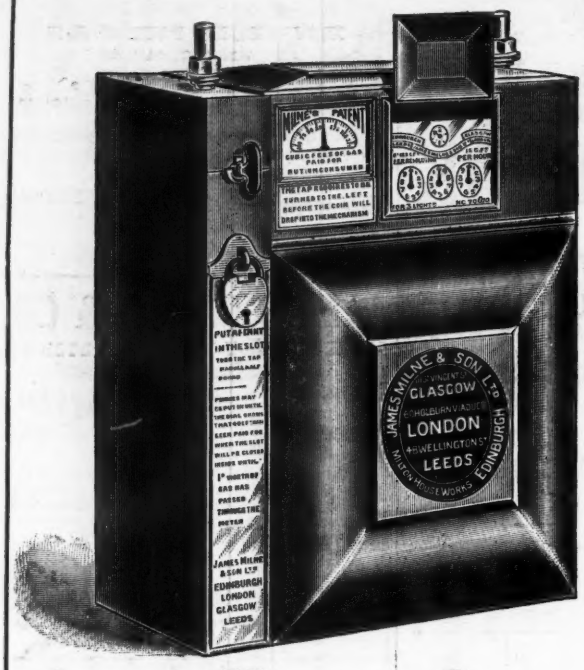
G. & J. HAIGH,

Raven's Lodge Fire-Brick Works, DEWSBURY.

Manufacturers of MACHINE-MADE RETORTS and

FIRE-BRICKS of the highest Quality, made from Fire-Clay of a most Superior and Refractory Character suitable for **GLASS-WORKS, GAS-WORKS, and BLAST-FURNACES.**

For Prices and Analysis, apply as above.



MILNE'S PATENT PREPAYMENT DRY METER.

MOST compact Attachment in the Market.

Same Height as an Ordinary Meter.

Composite Attachment Cover, easily removable, with extra large Money-Box, which is withdrawn while opening Door.

Absolutely Positive in Action.

The Whole Mechanism always in Gear.

The following unsolicited comparison has been sent us as showing the exact correspondence of amount due per Index and Cash in Money-Box with these Meters as against those of other Makers:—

Milne's	Meter due per Index	3/4	Cash in Box	3/4
Milne's	,, ,,	4/2	,,	4/2
Milne's	,, ,,	2/6	,,	2/6
Milne's	,, ,,	3/4	,,	3/4
Milne's	,, ,,	2/6	,,	2/6
Two other Makers.	,, ,,	6/8	,,	6/11
	,, ,,	1/8	,,	2/0
	,, ,,	3/9	,,	5/2
	,, ,,	2/6	,,	2/8
	,, ,,	4/7	,,	6/0

Above Results confirmed on further comparison.

JAMES MILNE & SON LTD.

MILTON HOUSE WORKS

EDINBURGH.

LONDON. GLASGOW. LEEDS.

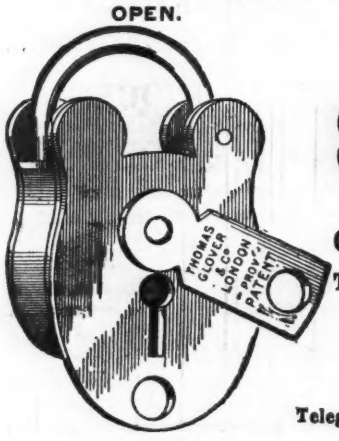
ESTABLISHED 1844. **ORIGINAL MAKERS.** ESTABLISHED 1844.

LONDON, 1851. NEW YORK, 1853. PARIS, 1855. LONDON, 1862. DUBLIN, 1865. PARIS, 1867.

THE SIX MEDALS AWARDED TO THOMAS GLOVER'S PATENT DRY GAS-METERS;

The latter being the Highest Award for Dry Gas-Meters at the Paris Exhibition, 1867. Since then we have not Exhibited FOR PRIZES.

OPEN.



THOMAS GLOVER & CO.'S

PATENT

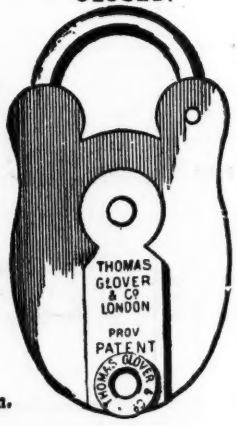
SECURE PADLOCK

PREVENTS TAMPERING WITH THE

CASH-BOXES OF PREPAYMENT METERS.

The Padlock is Sealed by means of a Lead Eyelet, which is impressed with Company's private mark. Eyelets easily fixed and removed by Company's Collector.

CLOSED.



Telegraphic Address: "GOTHIC, LONDON." Telephone No. 725, Holborn.

THOMAS GLOVER & CO., LTD.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN, LONDON, E.C.

BRISTOL: 28, BATH STREET. *Telegraphic Address:* "GOTHIC." Telephone No. 1068.

BIRMINGHAM: 1, OOZELLS STREET. *Telegraphic Address:* "GOTHIC."

MANCHESTER: 37, BLACKFRIARS STREET. *Telegraphic Address:* "GOTHIC." Telephone No. 3096.

GLASGOW: ARGYLE WORKS, KINNING PARK. *Telegraphic Address:* "GASMAIN." Telephone No. 1325 South Side.

A. & J. STEWART AND MENZIES,

LIMITED,

MANUFACTURERS OF

WROUGHT-IRON WELDED

TUBES AND FITTINGS

OF ALL DESCRIPTIONS FOR

GAS, STEAM, AND WATER.

LIGHT LAP-WELDED WROUGHT-IRON AND STEEL TUBES

WITH STEWART'S PATENT FLANGED JOINTS.

HOT WATER HEATING TUBES

(PERKIN'S SYSTEM).

SOLID DRAWN STEEL TUBES

CAST-IRON PIPES

STEEL AND IRON PLATES FOR BOILERS, BRIDGES, &c.

OFFICES:

41, Oswald St., Glasgow.

JAMES McKELVIE & Co.,

Cannel & Gas Coal Merchants,

HAYMARKET, EDINBURGH;

and 37 & 38, MARK LANE, E.C.

PRICES AND ANALYSIS

OF ALL THE PRINCIPAL

CANNEL AND GAS COALS

forwarded on Application.

ESTABLISHED 1840.

ALL THE

Gas Engineers who are considering the introduction of Inclined Retorts and Coal Handling Machinery would do well to get permission of B. W. Smith, Esq., to inspect the installation of

INCLINED RETORTS

which we have completed for the Urban District Council of Smethwick, and of which the Chairman of the Gas Committee, John Stones, Esq., says that they "are a GREAT CREDIT to all concerned, and MOST SATISFACTORY" to himself. We manufactured the whole of the Ironwork and Machinery, except the Gas-Engine,

AT

our own Works, and the Settings also are of our own special design. Go to

SMETHWICK

and judge for yourselves as to the substantiality of the design, the excellence of the workmanship, the successful working and the beautifully even heats. No creeping of Coal in the Retorts, nor any abominable probing and tickling take place. Note the Measuring-Chambers and the Charging-Shoots, which

WERE CONSTRUCTED BY

W. J. JENKINS & Co., LTD. RETFORD.

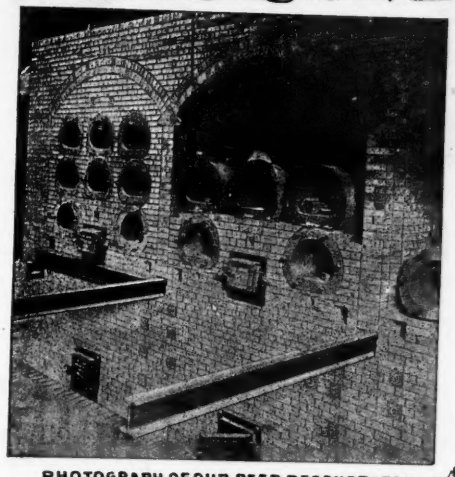
THE LEEDS FIRECLAY Co. LTD.

WORTLEY, LEEDS.

Engineering Department

RETORT SETTINGS

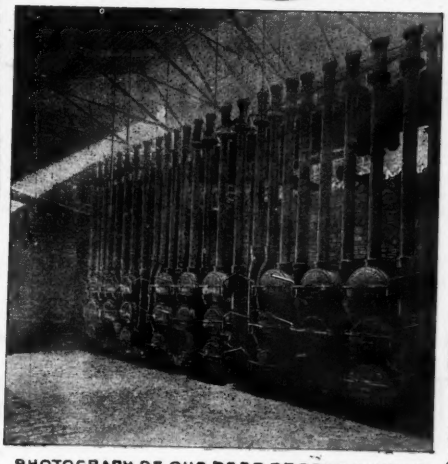
OF EVERY DESCRIPTION



PHOTOGRAPH OF OUR DEEP REGENERATORS DURING CONSTRUCTION.

Shallow Regenerators A Speciality.

Many Installations. Excellent Results Obtained.



PHOTOGRAPH OF OUR DEEP REGENERATORS AFTER COMPLETION.

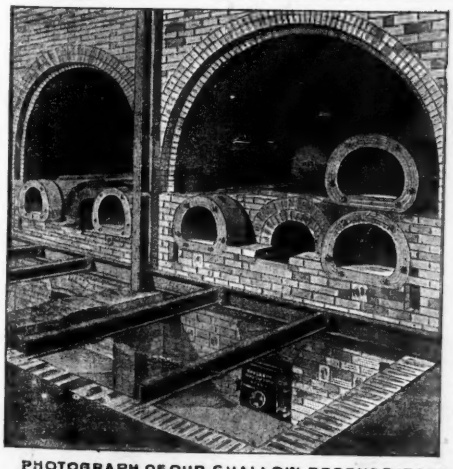
Inclined and Horizontal Regenerator, Generator, and Direct Fired.

RETORTS RE-SET.

RETORT IRONWORK

COAL & COKE BREAKING AND CONVEYING APPARATUS.

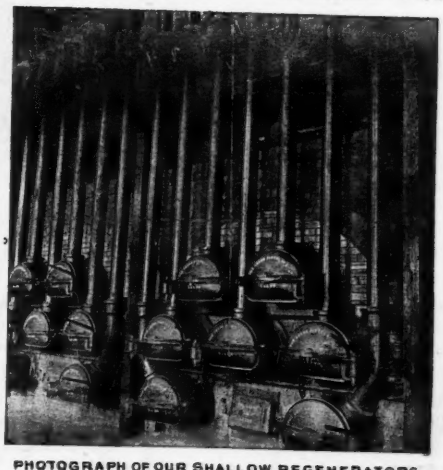
BUILDING ROOFS &c



PHOTOGRAPH OF OUR SHALLOW REGENERATORS DURING CONSTRUCTION.

Telegrams "Settings" Leeds

Telephone No. 612.



PHOTOGRAPH OF OUR SHALLOW REGENERATORS AFTER COMPLETION.

MAURICE GRAHAM,
Managing-Director.

Telegrams:
"ACCOUPLE, LEEDS."

GRAHAM, MORTON, & CO.

— LIMITED —

INCLINED RETORTS
AND ALL CLASSES OF
ELEVATING & CONVEYING MACHINERY
— Contractors to Her Majesty's Government. —

LEEDS.

Telegrams: "Robustness, London."

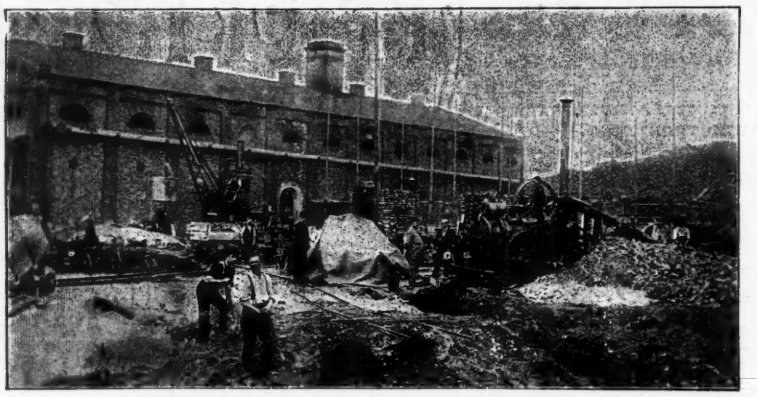
RETORT-HOUSE, SETTINGS, & RAILWAY
IN COURSE OF ERECTION BY OUR OWN WORKMEN.

Telephone: No. 756 Bank.

Plans, Estimates, and Specifications prepared and submitted.

Special Facilities for RECONSTRUCTING GAS-WORKS.

CONDENSERS,
SCRUBBERS,
WASHERS,
EXHAUSTERS,
TANKS,
and every
REQUISITE.



A SPECIALITY.
INCLINED and FLOOR-LEVEL SETTINGS with or without REGENERATIVE or GENERATOR FURNACES, with or without IRONWORK.
COMPLETE RE-SETTING.

J. & H. ROBUS, Engineers and Contractors, 20, BUCKLERSBURY, LONDON, E.C.
GASHOLDER TANKS AND MAIN LAYING.

H. KIRKHAM'S PATENT "IMPERIAL" WASHER-SCRUBBER.

TESTIMONIAL

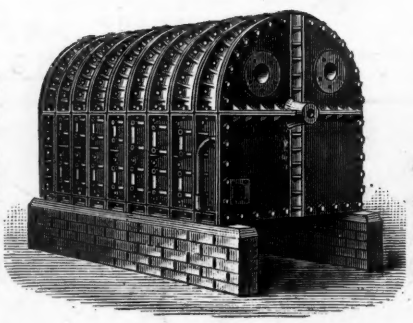
The Dover Gaslight Company,
Gas-Works, Buckland,
Dover, Feb. 8, 1899.

H. KIRKHAM, Esq.

Dear Sir,—Have now made further tests with the Washer fitted with your PATENT WASHING DEVICES, and have much pleasure in reporting that *the results were highly satisfactory*; also, I ascertained that the maximum results were obtained when the machine was working at three revolutions per minute. At this speed 13 to 14 gallons of water per ton of coal carbonized were converted into 10-oz. Ammoniacal Liquor, and at same time the Gas was free from Ammonia.

Should you wish further details, I will forward them.

I am, dear Sir, yours truly,
RAPHAEL HERRING, Engineer.



EFFICIENCY GUARANTEED.

Estimates given for a complete set of Segments for one wheel, or for refitting the whole number of wheels in a machine, also for Washer-Scrubbers complete.

The Scrubbing Devices are metal scrolls fixed in cages of segmental form, which can be readily and successively removed from the wheels through a manhole on the top or side of the machine, and the enclosed Scrubbing Devices taken out, cleaned, and replaced without the delay that necessarily takes place when the entire scrubbing material of the whole wheel has to be dealt with in one operation—thus effecting an important saving in time and labour. These Cages can be applied to the wheels of any machines of the type shown, and will increase their efficiency above 20 per cent.

The Scrubbing Devices are unequalled for extracting the whole of the Ammonia and a very large proportion of the Carbonic Acid and Sulphuretted Hydrogen from the Gas; and, if required, the strength of the Ammoniacal Liquor can be worked up to 30 oz. and above, which greatly reduces the quantity of Oxide or Lime, and also the amount of Labour for Purification.

OFFICE: 25, Victoria Street, Westminster, LONDON, S.W.

MACKRELL BROS.,

Buslingthorpe Lane, LEEDS,

Manufacturers of

IMPROVED GAS-METER PERSIANS.

UNSURPASSED FOR QUALITY AND VALUE.

WILLIAM INGHAM & SONS,

Incorporated with the Leeds Fire-Clay Company, Ltd.,

WORTLEY FIRE-CLAY WORKS,

Near LEEDS,

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT

MACHINE-MADE GAS-RETORTS.

BOWENS' Ltd. Successors,

STOURBRIDGE.

MANUFACTURERS OF

BEST FIRE-BRICKS; INCLINED, HORIZONTAL, and SECTIONAL RETORTS; LUMPS, TILES, &c., of every description.

Established 1860.

OSLER,

BIRMINGHAM.

MANUFACTURERS OF GASELIERS IN GLASS AND METAL.

EXHAUSTING MACHINERY.

OLDEST MAKERS OF ROTARY EXHAUSTERS.

WALLER'S PATENT 4 & 3 BLADE EXHAUSTERS

(3 Blade under 40,000 per Hour)

Use LESS Steam and give a STEADIER Gauge than any other type of Exhauster.

EXHAUSTERS CONVERTED TO OUR PATENT TYPE

Give 30 to 40 per cent. increased Capacity with the SAME Power and at the SAME Speed.

OVER 500 IN USE.

OLDEST MAKERS OF THE BEALE EXHAUSTER SUPPLIED TO OVER 400 WORKS.

PATENT WASHER-SCRUBBERS, WITH WOOD CLUSTERS.

Gas-Valves, Governors, Steam-Regulators, Coke-Breakers.

CATALOGUES, PLANS, SPECIFICATIONS, AND ESTIMATES ON APPLICATION.

GEORGE WALLER & CO., 165, QUEEN VICTORIA ST., E.C., & STROUD, GLOUCESTERSHIRE.

WORKMANSHIP and MATERIALS OF THE HIGHEST QUALITY.

PECKETT'S LOCOMOTIVES

Built to any Specification or Gauge.

PECKETT & SONS, Atlas Locomotive Works, BRISTOL.

MOBBERLEY & PERRY

STOURBRIDGE.

Manufacture & supply best quality of

Gas Retorts (SEGMENTAL, HORIZONTAL, or INCLINED.)

Special Bricks & Blocks for GENERATOR & REGENERATOR FURNACES.

FIRE BRICKS, LUMPS, & TILES, BLUE STAFFORDSHIRE VITRIFIED BRICKS FOR PAVING, &c., &c.

EVERY REQUISITE FOR GAS-WORKS. Retort Setters sent to any part of the Kingdom.

London Agents: Contractors for the erection of Retort-Benches complete.

Gas Engineers and Contractors,

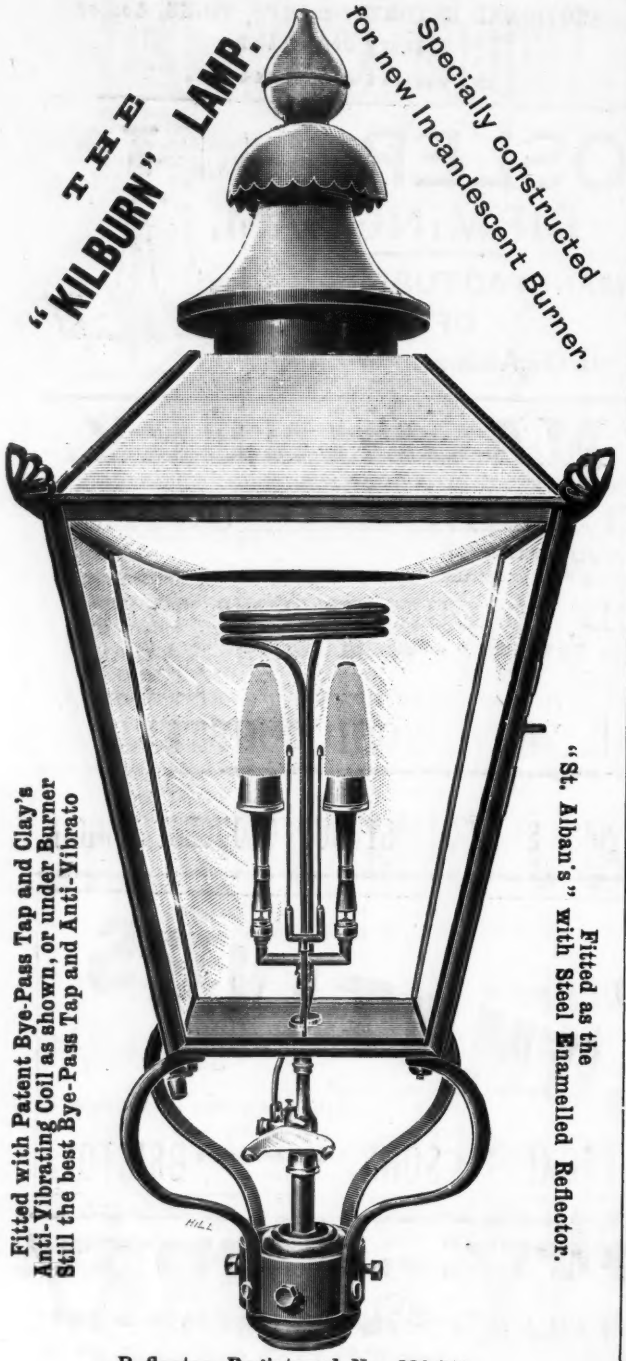
BALE & HARDY, BRIDGE HOUSE, 181, QUEEN VICTORIA STREET E.C.

H. GREENE & SONS,

LIMITED.

THE "KILBURN" LAMP.

Specially constructed for new Incandescent Burner.



Fitted with Patent Bye-Pass Tap and Clay's Anti-Vibrating Coil as shown, or under Burner Still the best Bye-Pass Tap and Anti-Vibrato

Fitted as the "St. Alban's" with Steel Enamelled Reflector.

Reflector Registered No. 330,319.

Gas-Fittings for Automatic Installations.

19, FARRINGDON ROAD

(Late of Cannon Street),

LONDON, E.C.

Telegrams: "LUMINOSITY, LONDON." Telephone: 1215 Holborn.

THE

DENAYROUZE

LIGHT SYNDICATE,

THE

PIONEERS OF NO CHIMNEYS,

still hold their own on the market for the

HIGHEST CANDLE POWER

for each Cubic Foot of Gas at ordinary Pressures.

The Syndicate's Three-Light Cluster, governed to consume only 24 Cubic Feet of Gas per Hour, gives

550-CANDLE POWER,

which speaks for itself.

The Syndicate works under the

BANDSEPT PATENTS;

and Bandsept, who was the first to adopt the Injector Principle, is

STILL AHEAD OF ALL RIVALS;

and the combination of his Burners with Welsbach Mantles can be fearlessly tested against any others

ON THE MARKET.

Call and see these Burners.

AT THE

OFFICES OF THE SYNDICATE,

28, VICTORIA STREET, S.W.

CHARLES EDWARD MASTERMAN,

General Manager.

HARPER & MOORES,
STOURBRIDGE.

MANUFACTURERS OF

BEST FIRE-BRICKS, GAS-RETORTS,
LUMPS, TILES, AND ALL ARTICLES IN FIRE-CLAY.

Proprietors of Best Glasshouse Pot, Crucible, and other Stourbridge Clays.

Manufacturers of Glasshouse Pots and Crucibles of every kind.
Established 1836.

JOSEPH CLIFF & SONS,

INCORPORATED IN
THE LEEDS FIRE-CLAY COMPANY, Ltd.

WORTLEY, LEEDS.

LONDON OFFICES & DEPÔTS:

Baltic Wharf, Waterloo Bridge.
WHARVES NOS. 2 & 4, INSIDE G.N. GOODS YARD, KING'S CROSS, N.
LIVERPOOL:
16, Lightbody Street.
LEEDS:
Queen Street.

MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.
Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

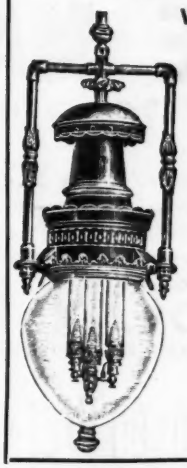
A PERFECT LIGHT AT LAST!!!

Light your Windows from the Outside!!!

THE IMPROVED

Tudoria Lamp,

Davies and Still's Patent, Designs Registered,
FOR
Inside & Outside Lighting
Of Shop Windows, Lobbies, Halls, Saloon Bars, and other places.



WIND-PROOF. DUSTPROOF. RAINPROOF.

Regd., 332,672.

A SPLENDID ADVERTISING MEDIUM FOR ALL SHOPKEEPERS.

Price from **90s.** *each. Burners and Mantles extra.*

LIBERAL DISCOUNT TO THE TRADE.

W. M. STILL & CO.,
24, Charles St., Hatton Garden,
LONDON, E.C.

R. & J. DEMPSTER, LTD.
GAS PLANT WORKS,
OLDHAM ROAD, MANCHESTER.

CARR'S PATENT
SUPERHEATER
FOR SULPHATE OF AMMONIA OR OTHER PLANTS.

With this Superheater, the **Temperature of the Liquor can be raised to 190° Fahr.** before entering the **Still** by means of the Waste Gases only; **Steam and Fuel are saved**; the **capacity of the Plant is increased**; the **cheapest unrefined acid can be used**; and **less condensing power is required.**

Prices and Particulars on Application.

THE WIGAN COAL & IRON CO., LIMTD.,

Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

Midland District Office: PRINCE'S CHAMBERS, 6, CORPORATION STREET, BIRMINGHAM—Sole Agent: A. C. SCRIVENER.
Telegraphic Address: "WIGAN, BIRMINGHAM." Telephone No. 200

London District Office: 6, STRAND, LONDON—C. PARKER & SON, Sole Agents.
Telegraphic Address: "PARKER, LONDON."

JOHN BROWN & CO., LTD., SHEFFIELD,

Proprietors of

ALDWARKE MAIN, CAR HOUSE & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.

ALDWARKE MAIN GAS COAL

Analysis: 12,600 Feet of 19-Candle Gas per Ton.

Value in Pounds of Sperm, 820·80.

VERY FREE FROM IMPURITIES.

TELEGRAMS: "ATLAS, SHEFFIELD."

HUTCHINSON BROS. & CO. LD.

GAS ENGINEERS, &c.,

MANUFACTURERS OF

Improved Wet & Dry Gas-Meters.

STATION-METERS. LAMP-METERS.

Test Gasholders and General Gas Apparatus.

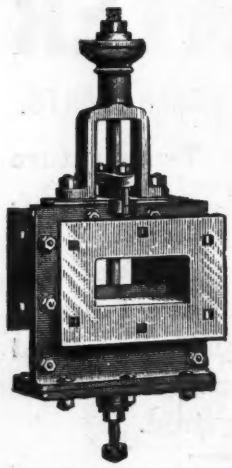
Brass Main & Lamp Taps. Unions, Ferrules, &c.

The "Falcon" Lamplighter's Torch. Service Cleansers.
SYPHON AND OTHER PUMPS.
WOOD AND WROUGHT-IRON PURIFIER-GRIDS. SCRUBBER BOARDS.
WET AND DRY METERS REPAIRED.

FALCON WORKS, BARNSLEY.
Telegrams: "HUTCHINSON BROS., BARNSLEY."

Telegraphic Address: "CLAPHAM BROS., KEIGHLEY."

National Telephone No: "KEIGHLEY 35."



"TRADE FOLLOWS THE FLAG"

CLAPHAM BROTHERS LTD

KEIGHLEY, YORKS. ESTABLISHED 1837

"SPECIALTIES"

London Representative:
THOMAS B. YOUNGER., C.E.
CHESTERFIELD HOUSE, 93, GREAT TOWER STREET.

Contractors to Her Majesty's Government.

WELLINGTON, NELSON, AND MARKET STREET WORKS.

LONDON: Printed by WALTER KING (at the Office of King, Sell, and Railton, Ltd., 12, Gough Square); and published by him at 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, June 20, 1899.